

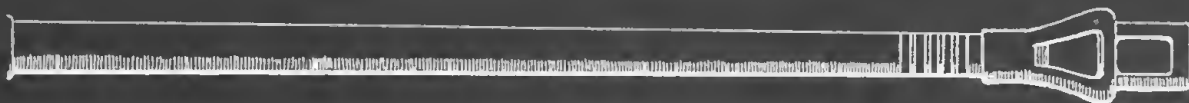


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**A MAGAZINE FOR MILITARY VEHICLE ENTHUSIASTS**  
**Volume 5    Number 10**



# Muzzle Blast



## LETTERS • COMMENTS • NOTES • CORRECTIONS • ADDITIONS

### COMMENTS ON SOVIET MEDIUM TANKS.....

To the Editor:

I very much enjoyed your article in the latest issue of your magazine on the T-54/55 and T-62 Soviet tanks. It is refreshing to see a fairly accurate article on the T-62, long considered by many unacquainted with the vehicle, as a 'super tank'. However, there were some errors and some areas which needed to be expanded for a fuller understanding of the vehicle.

The U.S. M60A1 tank, when compared to the T-62 on level ground, is high in silhouette. Yet that turret height allows the gun to be depressed 10°. This allows the M60A1 to move into a hull down position and still engage targets to its front while covered. The T-62 is limited to 4°-5° of gun depression and to engage the same target must expose its hull. Owners of both the Tamiya M60A1 and T-55 tanks can try this for themselves.

The T-54/55 and T-62 tanks do not have a Christie suspension. The Christie suspension depended on coil springs and bell-cranks mounted between the hull walls. The current Soviet tanks have a standard torsion bar suspension. The confusion arises from the fact that, as in a pure Christie suspension, the T-62 used dead track, large road wheels and no support rollers. The American examples (but with live track) are the M113A1 APC and the M551 Sheridan.

The difference in track must also be clarified. A live track has the track pins set in rubber bushings so that movement between the track blocks is taken up by twisting the rubber. A dead track simply has the blocks twisting around a single metal pin. This dead track tends to have a short track life due to the metal-to-metal contact. It is also loud and inexpensive.

Whether or not a tank has live or dead track has no bearing on whether or not it rides on support rollers as on the M60A1. The British Centurion and AMX 30 both have suspended dead track while the M551 has non-suspended live track. The live track may be either double-pin or single-pin track, the difference being that double-pin track is held together with end connectors and often center guides if it is double-block track as on the M60A1. In single pin track, one track pin holds the blocks together.

The T-62 at Fort Knox does not have the circlip-type track pin retainers. It uses a steel wiper plate at the rear of the hull to knock the track pins back into their proper location as the unretained pins work out of the track toward the hull.

The article does give a good picture of the vehicles' maintainability, but it should take into consideration the Soviet's plan of replacing tanks instead of repairing them. Israeli use of captured Soviet tanks has shown them to be very good combat vehicles and in the hands of a well-trained crew, the equal of the M60A1. The cry of American quality is at best misguided and at worst an illusion to cover up our horrible numerical inferiority in Europe. The M60A1 and T-62 tanks are both very good vehicles and are both capable of doing well the jobs they were designed to do.

I am looking forward to the concluding article in the next issue.

Sincerely,

1LT Michael L. Berry  
Ft. Knox, KY

### ...AND ON THAT POLISH GAS DISPENSER....

Dear Editor:

With references to the picture from a German publication sent in by Mr. Steve Cobb and published in the Volume 5, Number 9 issue of *AFV-G2*, the following information is forwarded.

This picture is undoubtedly one of a Polish conversion of a 1918 Renault FT into a smoke tank. The conversion was made by removing the turret and installing a large chemical tank over each track, with two large blower-mixers above the center of the hull for dispensing the smoke under pressure. The work and experiments were carried out during the period of 1923-25. Results were not satisfactory. Most likely because the smoke was soon drawn into the tank, blinding the crew, and the tank was so slow that it got lost in its own smoke screen.

Incidentally, we tried the same concept in this country on the Six Ton Tank with the same results. Both our efforts and the Poles were made to do something with the very, very many Renault or Renault FT modifications available around the tank parks of most nations in the 1920-30's.

The picture was just one more German use of rather poor propaganda methods. The tank might have been able to dispense gas, but it would have been hard on the tank crew or any friendly troops with a few country miles, considering the vagaries of the wind. In addition, the vehicle in the photograph appears to be towing some kind of anti-aircraft gun, and that I am sure a gas dispenser in the front lines would not consider the thing to be doing.

Hope this might throw a little light on the subject.

Sincerely,

Leo D. Johns  
Colonel USA Retired  
Newport News, VA

Dear Editor:

The vehicle shown in 'Armor in Pictures' in Volume 5, Number 9 was a poison gas/smoke screen dispenser fitted experimentally to an FT-17 by the technical staff of the *1 pulk czolgow* (1st Tank Regiment) under Colonel Stanislaw Kardaszewicz and Colonel Rucinski during the fall of 1923. It was one of a number of conversions based on the FT-17 which were tried experimentally by the Polish Army in the early twenties. There was no official designation, though it was probably called '*czolg lekki fumatory FT*'. It was never adopted for service use, though it was widely photographed during maneuvers, etc. Hope this answers your reader's inquiry.

Regards,

Steve Zaloga

### '77 EUROPEAN AFV EXPEDITION'

Dear Editor:

Since returning from Europe last year I have met and talked with many AFV buffs, and a large number of them have asked me if I plan to go on other trips to Europe and track down more of the AFVs that are still in Europe on display at museums and private collections. I have stated to all the people that I have talked to that I plan to go on other trips to Europe and a large number of them have asked me that if they donate money for

Continued on Page 47



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## Cover:

**Front Cover:** Two U.S. Marines pause to look over a knocked-out Japanese Type 95 Light Tank on Tinian. In the background, an M3 Gun Motor Carriage towing a 37mm anti-tank gun moves forward in mopping-up maneuvers. This photo was taken in July of 1944 and shows troops of the U.S. 4th Marine Division. Photo Credit: USMC

**Rear Cover:** The two rear cover photographs show two German *Jagdpanzer 38(t)* tank destroyers arriving at Aberdeen Proving Ground shortly after the end of World War II. Both vehicles were from the same German unit, and show virtually identical dapple-finish camouflage schemes of the so-called 'ambush' pattern. It appears that these vehicles were used to furnish spare parts for a test vehicle; the two vehicles were probably scrapped in the early 1950's. Photo Credit: U.S. Army

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*AFV-G2* is a magazine, published for Military Vehicle Enthusiasts, with the purpose of gathering and disseminating information about Military Vehicles and their employment; to provide an opportunity for persons seriously interested in the history of Military Vehicles, in the modeling of these vehicles and associated equipment, and in the playing of Military Wargames utilizing miniature vehicles, to share ideas and items of mutual interest and to promote an interest and awareness of the subject of Military Vehicles.

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Modern Soviet Medium Tanks:  
an Appraisal...

## INTRODUCTION

In the preceding installment of this article, the Soviet family of medium tanks was discussed in general terms, followed by a somewhat detailed appraisal of the hull, engine and drive train, and suspension systems of these vehicles. This installment continues with an appraisal of the turret, its weapons, and optical and fire control systems, as well as the combat operations of the vehicle.

## THE TURRET

Turrets on Soviet T-54's, T-55's, T-62's and the new medium tank (variously identified as the T-64, T-70 or T-72) are more than casually similar. In shape, they closely resemble an egg sliced horizontally with the pointed end facing forward. Obviously, this turret form is excellent in terms of ballistic protection, as a curved surface is presented at virtually any target angle. In comparison with other modern medium tanks, the Soviet turret is relatively small; the vertical space within the turret is quite restricted by the semi-circular shape in combination with the effective diameter. As the diameter of the turret is a function of the vehicle width (as this determines the size of the turret ring), the narrow width of Soviet medium tanks inevitably has resulted in a small turret with cramped internal spaces.

Soviet turrets are cast in construction, and uniformity of the castings has apparently left quite a bit to be desired; apparently there are a number of metallurgical problems which have so far defied solution. Comments have come from Czech sources of uneven and variable hardness in turret walls, and it should be apparent that soft areas (in terms of hardness) offer less protection against penetration by enemy projectiles. In fact, photos have come from Israeli sources showing severe internal spalling which resulted from impact of non-explosive armor projectiles against T-54 and T-62 turrets. In one case, a non-penetrating armor-piercing projectile caused such severe jagged spalling that death of turret crewmembers resulted, as well as an explosion of stowed machine gun ammunition.

In common with virtually all western medium tanks, Soviet turrets are crewed by three men; a tank commander, a gunner and a loader. The turret layout on Soviet vehicles is opposite to that of American tanks; the tank commander and gunner occupy the space to the left of the main gun (directions are facing the front of the turret), while the loader stands/sits on the right side of the main gun. Internal space is very cramped. Russian manuals indicate that only the smaller Russian soldiers are selected for tank training, and it appears that most Soviet tankers are shorter than 5-feet, 5-inches in height. We have received numerous comments from American soldiers who indicate that the turret fighting area is much too small for them. In addition, we have received comments from an Israeli tanker who received training on captured T-55 tanks; the Israeli comments echo the American notes and indicate that fatigue of the turret crew is considerable, resulting from lack of space and high noise levels, as well as vibration. It is apparent that the gunner's head is virtually in the commander's lap, and that it is almost impossible for the loader to stand upright, even if he is of short stature. When the small size of the loader is compared with the weight of the complete rounds of ammunition that he must load into the main gun, it is obvious that he must have a very fatiguing job.

The main tank gun separates (and divides) the tank turret in half along vertical and longitudinal axis. The very size of the main gun has also created a number of operational problems, especially in terms of reloading. The low turret roof interferes with reloading of the main gun unless the weapon has been elevated to its maximum limits. In terms of practical operation,



Photo, Above: A Syrian T-62 medium tank captured by the Israelis during the Yom Kippur War. The shell ejection hatch at the rear of the turret is open and the 14.5mm turret-mounted machine gun is missing. Note the fording tube and the location of the infra-red night sight which is missing. Photo Credit: Israeli Defense Force, via Earl H. Peppers.

this means that the gunner must elevate the main gun tube (in T-54's and T-55's) before the loader can have the necessary room to insert a new round of ammunition. Of course, this also means that the gunner must displace his optical sighting scopes while this reloading is taking place. All this adds additional time between shots. The shape of the turret also severely limits that amount of depression of the main weapon, as the breach of the gun hits the turret roof at any real angle of depression. Operationally, this means that Soviet tanks cannot effectively fire from reverse slopes or in situations where the weapon must be depressed (as in down-hill shooting). There apparently has been no real solution to these problems, as new Soviet designs continue to use the same shape and size of turret. Soviet designers have attempted to cope with the reloading problems; in newer vehicles such as the T-62, the gun is automatically elevated to its maximum limit immediately after firing. This, of course, relieves the gunner of this task. In addition, an automatic shell ejection system has been incorporated into the T-62; this system catches the ejected shell casing as it leaves the gun breach and then flips the ejected shell case through a rectangular hatch (which automatically opens at the required time) in the rear of the turret. These solutions indicate that attempts are being made to live within the existing system instead of changing to a more effective one.

## THE WEAPONS

The main gun in the Soviet T-54 and T-55 is a conventional 100mm rifled weapon which was derived from a World War II naval gun. Designated as the D-10T, this weapon fires the same ammunition as the wartime gun used in the SU-100 tank destroyer. The original D-10T did not have stabilization fitted, and it really could not fire while the tank was on the move. The later D-10TG, as mounted in late T-54's, has vertical stabilization only; this stabilization keeps the weapon pointing in the same direction although the vehicle may be moving vertically. The still later weapon designated as the D-10T2S, mounted in late T-54's and T-55's, has both vertical and horizontal stabilization; this weapon has been widely retrofitted



Photo, Above: An Israeli modified T-SS medium tank moving forward during the Yom Kippur War. Note the converted gun tube (off-center bore evacuator) and the turret-mounted .30 caliber machine gun. Photo Credit: Israeli Defense Forces via Earl H. Peppers.

into earlier models of tanks. Soviet manuals emphasize that the stabilization systems are somewhat fragile and must be handled carefully; they also emphasize that a definite, standard turn-on procedure must be followed to eliminate functional problems and danger to the tank crew. The effect of the gun stabilization system is to permit fairly accurate main gun fire while the tank is moving over rough and broken terrain. Depending upon the accuracy of the gun sight and the effective training of the gunner in using the system, Soviet tanks can therefore be expected to engage enemy targets while advancing, and this offers both a psychological advantage as well as a practical advantage of firepower over an enemy. The 100mm gun is

Photo, Below: Israeli captured T-62's, photographed after the Yom Kippur War. The Israeli identification numbers can be barely seen on both tanks. Photo Credit: Israeli Defense Forces via Earl H. Pepper.



considered to be ballistically superior to the 90mm weapon used in the early models of the American M48 medium tank; however, most sources now consider the 100mm gun to be inferior in accuracy and penetration to the 105mm gun which is now standard in NATO tanks. The 100mm gun fires high explosive fragmentation, armor-piercing high explosive (or APHE), high-velocity armor-piercing (or HVAP), high explosive anti-tank (HEAT) and armor-piercing discarding sabot (or APDS) rounds. Newer ammunition has been created in an effort to keep pace with western weapons; new rounds include both fin-stabilized non-rotating HEAT and fin-stabilized APDS projectiles. All models of the D-10T weapon have been fitted with infra-red night sighting equipment to extend usefulness into dark or dim light situations.

The main gun fitted into the Soviet T-62 is a fairly radical departure from previous Soviet weapons. It is a 115mm smoothbore gun which fires fin-stabilized, non-rotating, fixed ammunition. By using a smoothbore gun tube, a much higher

muzzle velocity is achieved; this high velocity provides a very flat trajectory and a very short time of flight for the projectile. On the other hand, a smoothbore weapon cannot have the same accuracy as a rifled weapon over the entire range, as at slower velocities, wind becomes a factor; this means that the Soviet 115mm gun is limited in effective range but that flat trajectory and high velocity give it an outstanding performance at shorter ranges (estimated at being under 1500 meters). The 115mm Soviet main gun is designated U-STS, and it can be easily recognized by its mid-tube bore evacuator. Like the earlier 100mm rifled weapons, the U-STS is stabilized in both the vertical and horizontal planes, and is provided with infra-red night sights. The penetration performance of 115mm ammunition appears to be equal to (if not better than) the NATO 105mm gun, and the high velocity ammunition should produce more accurate shooting over shorter ranges (such as is found in Western Europe). It appears that the U-STS is also mounted in the T-64 (T-70 or T-72). It should be emphasized, however, that the 115mm weapon (and the T-62) is not designed to replace the 100mm weapon used in T-S4's and T-SS's. Instead, the T-62 is employed as a complimentary system which is designed to be used alongside of and integrated with other tank formations. Some sources indicate that the Soviet T-62 is designed as a

'breakthrough' tank which is to be used to breach heavily fortified positions, permitting the following tanks to deploy in the enemy rear areas.

All modern Soviet medium tanks are equipped with a 7.62mm coaxial machine gun. The early SGM (derived from the SGM) was used on early T-S4's, while the later PKT (derived from the PK and PKS weapons) is used on T-SS's and T-62's. These rifle caliber weapons are sighted up to 2200 meters, using the gunner's telescopic sight, and are employed using identical techniques to similar western weapons. These guns are gas-operated and were also used on early T-S4's and T-SS's as a fixed bow machine gun, positioned alongside of and fired by the driver, and visible only as a small round aperture in the tank's slanted bow plate. These bow weapons have now been discontinued, as they were apparently of limited usefulness. The SGM and PKT both use 250-round metallic-link belts, and both are electrically fired; however, they may be dismantled from the tank and

and fired manually as required.

Some but not all Soviet medium tanks are provided with an external 12.7mm DShK heavy machine gun, mounted on an anti-aircraft mount above the loader's hatch on the turret. The well-designed weapon's mount permits rapid traverse and elevation in search of air targets, and the larger caliber makes this weapon useful against ground targets also. The weapon was apparently mounted on the loader's hatch so as not to over-burden the commander in his cupola with its 'target-designator system'. The positioning of the mount, however, means that the loader, already burdened with reloading the main gun and caring for the coaxial machine gun, must also load and fire an externally-mounted machine gun. In addition, it is obvious that the external mount blocks part of the commander's vision to the right side of the tank, especially when he is 'buttoned-up' with the hatch closed. There is an apparent ambivalence in Soviet military minds in regard to this weapon, as some tanks have the anti-aircraft mount while others lack this system. Although of practical use against ground and air targets (especially helicopters), it may over-complicate what is otherwise a fairly simple fighting system.

#### OPTICAL and FIRE CONTROL SYSTEMS

One of the unique features of the Soviet medium tank design is the incorporation of a target designator system into the commander's cupola. This system is used by the tank commander to automatically designate targets to the gunner and to line-up the turret traverse system so that the main gun points at the target. The target designator consists of a sight located in the commander's cupola; this sight has control handles at its sides. The commander grasps the control handles and swings the rotatable cupola until the desired target is viewed in the optics of the target designator. Keeping the target under the index in the sight, the commander then pushes a button positioned in one of the handles; this causes the turret to automatically traverse until the main gun axis lines up with the axis of the target designator sight. Once the two axes are lined-up, the gunner can take over control of the gun and position his sights for an optimum shot. This target designation system has a lot of practical advantages; for one thing, it eliminates tracking error and parallax encountered by the commander who attempts to line up the main gun by viewing the target outside of the turret (as is now required in western tanks). In addition, since it performs automatically, the sight eliminates crew duties in traversing and then acquiring a target. The target designator system, however, is coupled with a turret traversing system which operationally is much too slow. Traverse is so slow in fact that whatever advantage is gained in designating a target with the sight is lost through slow movement of the turret. In fact, one of the great disadvantages of the tanks' fire control equipment is the slowness of turret traverse. During the recent Yom Kippur War, great numbers of Soviet tanks were 'beaten to the draw' by western tanks which could (and did) traverse very rapidly onto their targets and fire lethal first rounds while the Soviet tanks were still traversing their turrets.

Once the target has been acquired by the Soviet tank, the next obvious step is obtaining the range from the tank to the target. Soviet tanks, unlike their western contemporaries, do not have optical or electronic rangefinders, but instead rely on a stadiametric rangefinder within the gunner's telescopic sight optics. This stadiametric rangefinder consists of two lines: a flat horizontal base line and a curved ranging line above the base line. In operation, the gunner places the target base on top of the base line and then compares the vertical height of the target with a position on the curved ranging line. The exact position



The photo above shows the installation of typical infra-red illumination lights on Soviet medium tanks. The above vehicle is a T-62. The large diameter light is linked to the main gun in elevation and provides light for the gunner's passive night sight. The smaller diameter light visible just above the mantlet is the commander's cupola light which provides illumination for his target designator system; this light traverses with the cupola. Photo credit: Norman G. Dean III.

where the top of the target encounters the curved line indicates its range, which is read off of a calibrated scale beneath the base line. This system is reasonably accurate in operation when coupled with an ultra high-velocity, flat trajectory weapon such as the 115mm smoothbore gun of the T-62, since the flat trajectory of the projectile minimizes range errors. With other types of ammunition, however, the Soviet fire control system is less forgiving and the percentages of first round hits with the Soviet fire control system is apparently much lower than with western tank gunnery systems.

Once the target's range has been computed by the gunner, he positions the reticle in the gunner's telescopic sight so that the appropriate range line (for the correct round of ammunition) is superimposed upon the target's image. While most western fire control systems utilize ballistic computers which provide the necessary amount of weapon elevation, the Soviet gunner must manually and mentally position the correct reticle for range (and he has five choices) over the aiming point (which is not a cross but is instead a broad arrowhead with lead lines on both sides). While it is evident that many Soviet tank systems are simple in operation, it must be recognized that Soviet tank gunners do not have a simple aiming system within the telescopic sight, and it is apparent that a good deal of practice and experience are necessary to achieve a first round hit with this system. In fact, it is apparent that Soviet fire control systems lag seriously behind western systems in terms of operational simplicity and ease of operation. Soviet manuals point out that optical sights are fragile and must be handled very carefully by operators, and in addition, they point out that sight alignment must be verified periodically. Boresighting of the telescopic sight must take a fair amount of gunner's time, and probably must be done at intervals during combat. It is evident that Soviet tank gunners are carefully taught the methods of adjusting sights and fire by observation in order to correct errors in second and third rounds. Readers who are competent tankers will appreciate the difficulties inherent in the Soviet fire control system, which imposes quite a few limitations upon effective tank gunnery.

Soviet tank crewman are provided with a number of periscopes in the turret so that they can view their surroundings



# Vehicle Close-up:

The Soviet T-62A Medium Tank  
by 1LT Norman G. Dean III.

Interest in Soviet Medium Tanks has been constant since the last Arab-Israeli conflict brought US and Russian vehicles into direct confrontation.

This article illustrates features of the Soviet T-62A Medium Tank, several examples of which are in the hands of the US Army. The vehicles shown in this article were pictured at Fort Hood, Texas, where they were being used in a moving picture depicting combat against US armored vehicles. All photographs were taken by the author, and the two armored officers in the pictures are Captains Paris and Ward of the 2/252nd Armor. These photographs were taken in September of 1975.



Photo, Above: Upper Right View of T-62A. Note cruise fuel tanks (with rounded edges) on right fender with storage box in center. Officers are from 2nd Battalion, 252nd Armor, a North Carolina National Guard unit.



Photo, Above: Left Side View of T-62A. Note size compared to individuals; vehicles are 7-feet, 4-inches in height. The engine exhaust opening is clearly visible above the fifth and sixth road wheels. Note the prominent turret hand rails.



Photo, Above: Frontal view of two T-62A's, partially camouflaged in a wooded area. These vehicles are in running condition and are well-maintained.

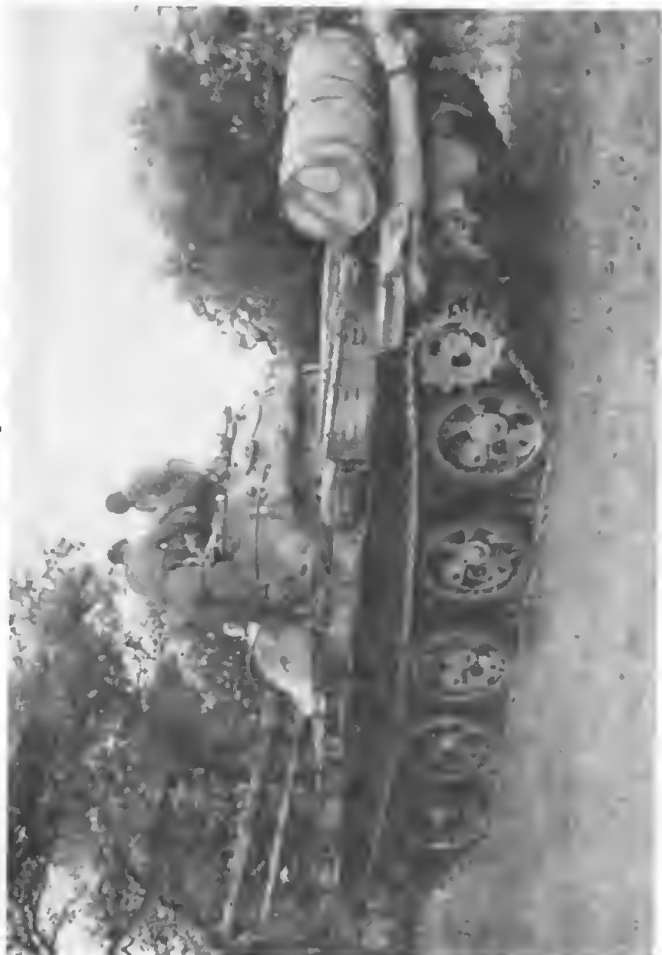




Above: Dismounting from the T-62A. This frontal view shows the clean, low-silhouette of this tank. The infra-red driver's light shows as black in this picture; the white light driving lamp is to the left of the infra-red lamp.



Above: Left front quarter view of the T-62A. This view clearly shows the towing hooks, water splash board and front lights on the T-62. The hull front slopes at 30°.



Above: Angled rear view of the T-62A, showing additional fuel storage example. In this case, the fuel drums are US 50-gallon containers, not Soviet equipment. The belief that these fuel drums are connected to the vehicle is incorrect. Fuel from the drums is transferred with a hand pump to the fender fuel cells.



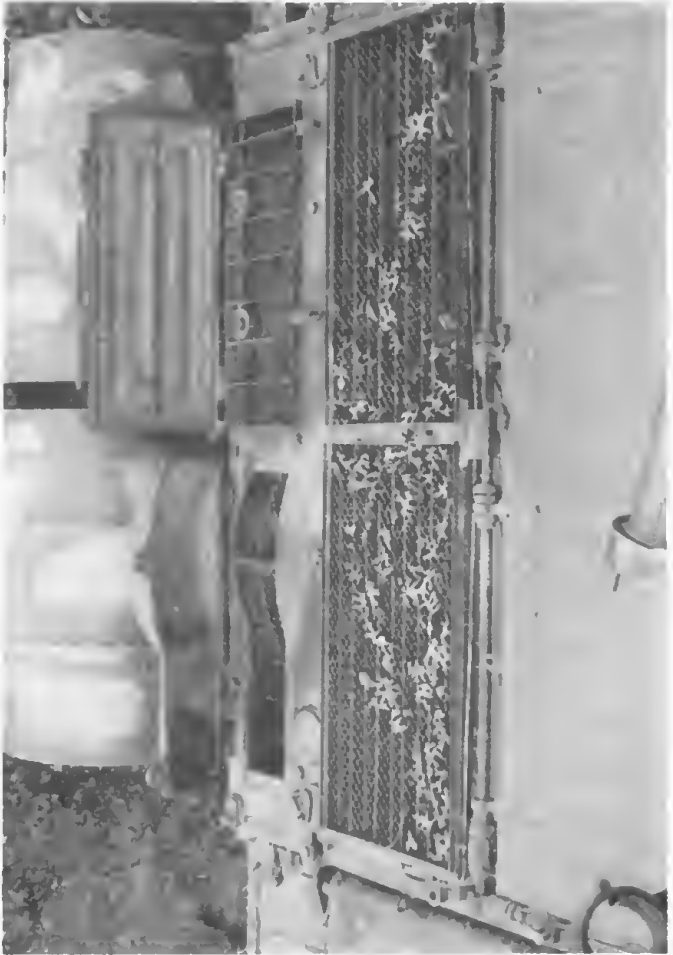
Above: A close-in angled rear view which clearly shows the onboard recovery log, which is carried up under the rear of the tank. Note the rear tow hooks. The cylindrical container on the rear of the turret contains the snorkel for deep-water fording. Most T-62's are fitted for this type of fording.



Above: Turret Rear view, with snorkel shown in stowed position. Main gun shell case ejection hatch is shown closed directly under identification light. The dome-like object to the left of the hatch is the ventilator for the turret.



Above: Fording exhaust cover in place for deep-water operations. Spring action cover is used to prevent water from swamping the engine exhaust. The rounded container above the exhaust port contains reserve oil for the engine.



Above: This photo shows the engine decking, looking aft. The mesh-covered openings are intake and exhaust openings for engine cooling air; the wire screens prevent leaves, dirt and trash from being sucked into the engine compartment. Note the covers used in deep-water fording exercises.



Above: Intake covers for deep-water fording. Note the covers hinge around a longitudinal bar, clamping in the closed position with thumb screws. Rubber gaskets provide a good seal against water seepage.



Above: Infra-red Gunner's light, shown with cover mounted. Note the linkage which is attached to the main gun tube. Small lamp to lower left is an auxiliary infra-red light. The coaxial machine gun port is directly below the main infra-red light; this port may be closed with a cover for deep-water fording.



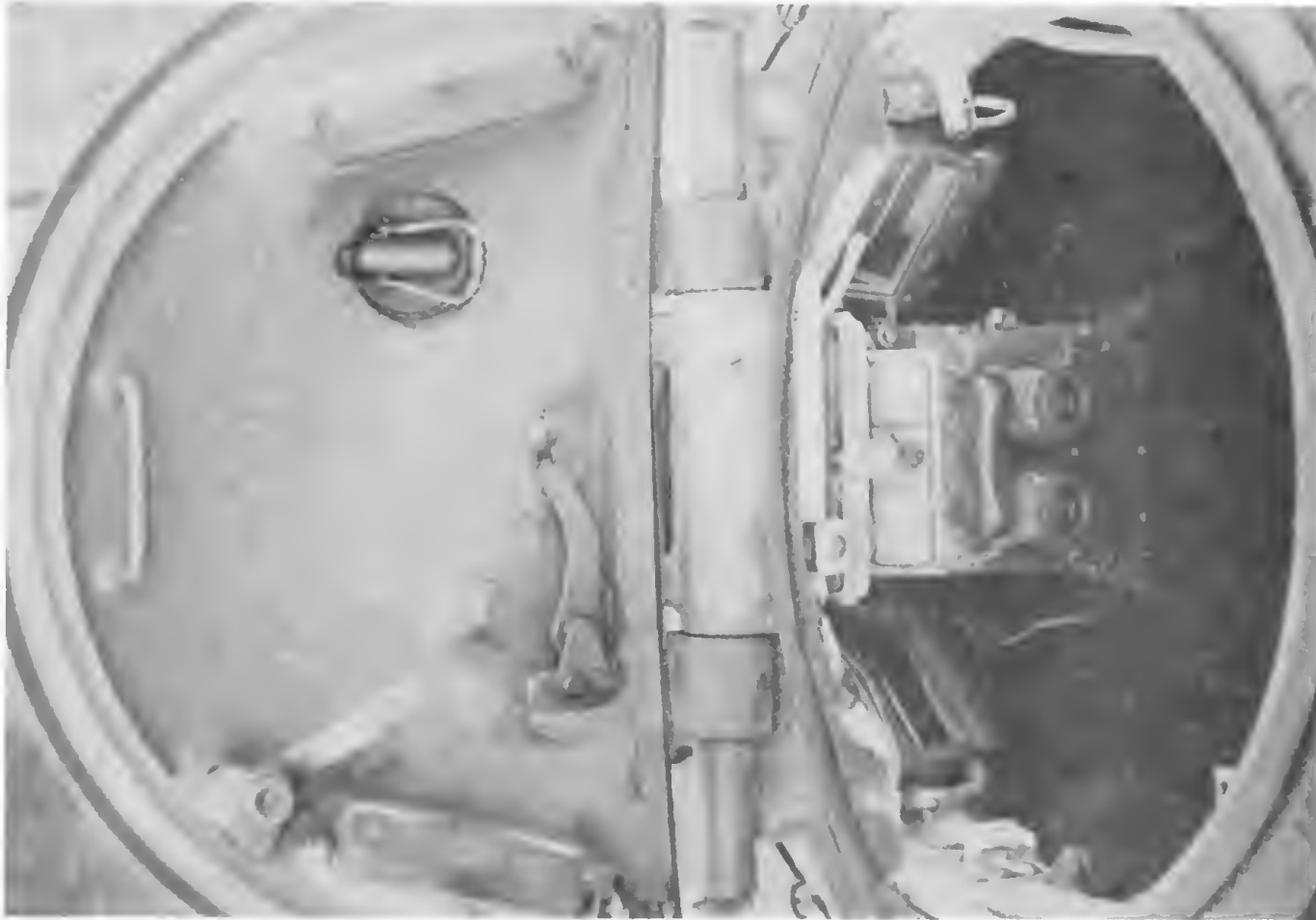
Above: An overall view of the commander's cupola, shown here in the closed position. The small searchlight is an infra-red lamp which rotates with the cupola but is adjusted for elevation manually. Note the very limited visibility.



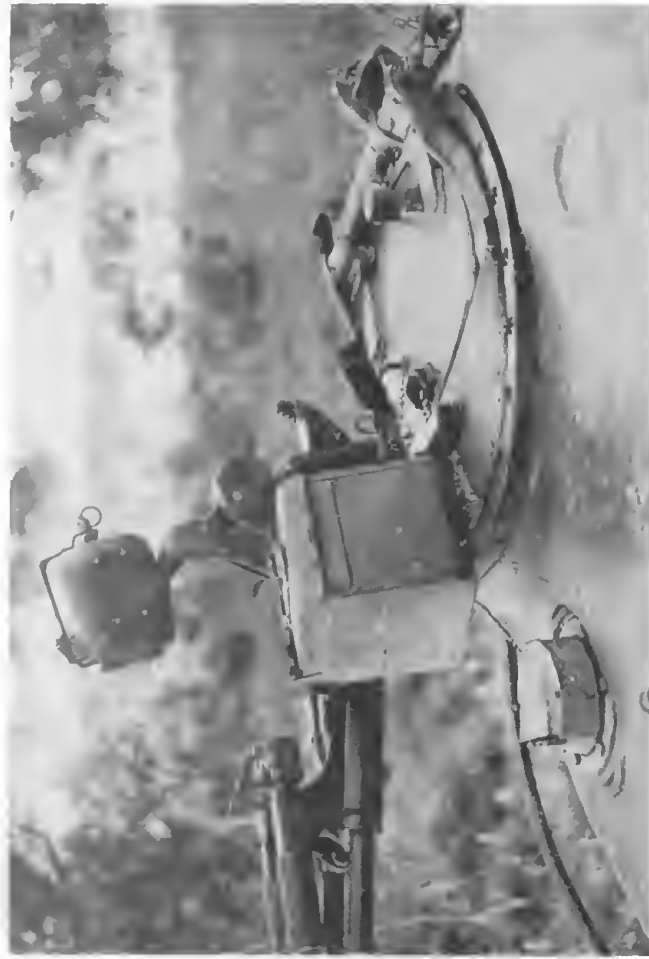
Above: Gunner's infra-red light, viewed over 115mm main gun tube. This view shows how light cover is attached. Note the canvas mantlet cover for the main gun.



Above: Commander's hatch and cupola from the front, showing infra-red searchlight (which is covered). Note Commander's periscope head just below light, slightly to the left. Also note the two vision periscopes to left and right of main periscope head. The Gunner's infra-red periscope head, which is covered, appears in the lower right of this photo.



Above: Commander's hatch, opened to front. This picture clearly shows the Commander's periscope which has a stadia-ranging system in its optics. This device is also used as a target designator; the Commander rotates the cupola until the target is visible in this periscope and then actuates the system, causing the turret to rotate to line-up with the optics of the periscope.

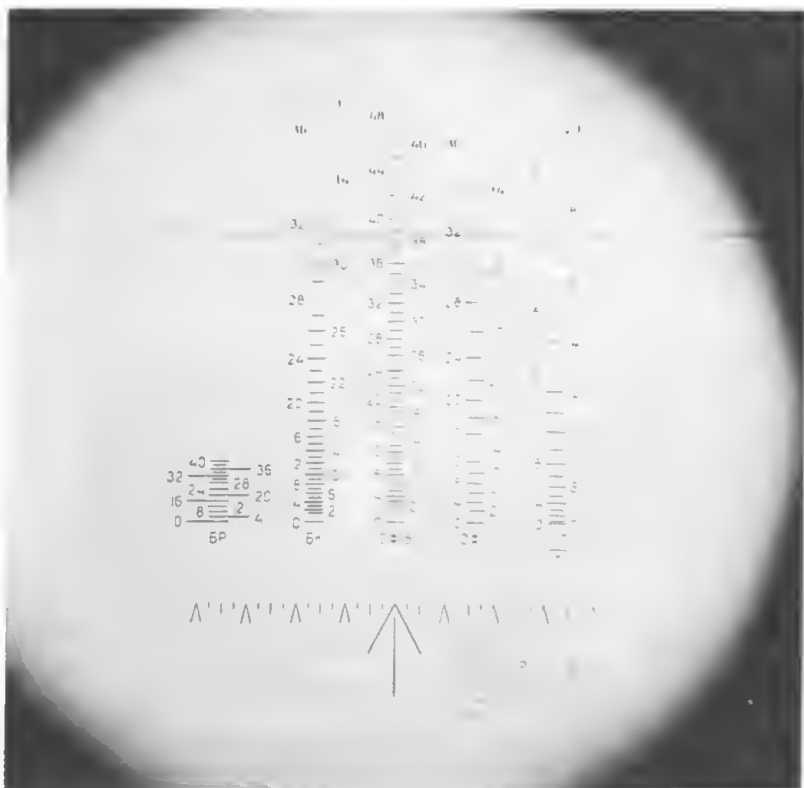


Above: Loader's hatch. Shown is the mount for the 12.7mm anti-aircraft machine gun (sight storage box above, and standard ammunition can below). This mount is counter-balanced and operates very easily. Just forward is the loader's periscope, which traverses, providing the loader with good vision along the side of the vehicle. This is also the position where the underwater snorkel is mounted.



Above: Formation lights, used to indicate position to neighboring tanks. These particular lights are mounted on the right front fender, showing illumination to the front and to the right rear. By viewing these lights at night, tanks can guide on other vehicles and maintain formation more easily.





Above: The sight reticle in the Gunner's telescopic sight on the T-62. At the bottom, looking like a big arrow, is the gunner's point of aim, flanked by leading lines. At the lower right is a stadia-ranging reticle, based on a 2.7-meter width. The various scales above the sighting line are used to input correct range into the gun for the various types of ammunition. From left to right, these indicate: APDS; HEAT; HE Frag, Charge 18; HE Frag, Charge 11; and Coax PKT machine gun.



Above: Various rounds of ammunition used in the T-62A's 115mm smooth-bore main gun. On the left is shown the High Explosive Fragmentation round; in the center is the High Explosive Anti-Tank (HEAT) round, and on the right is shown

the Armor-Piercing Discarding Sabot (APDS) round. Above, on the right is shown the tungsten-carbide penetrator from the APDS projectile. Note the inch scale next to each round of ammunition.



# SHILKA:

## *Major AA Threat on the Modern Battlefield*

by Bruce Daniel, Chief Designer, GHQ Micro-Armour

In the frontier towns of the Old West, gunslingers gained themselves a 'reputation' by becoming particularly deadly with their six-guns. The same process happens with military weapons.

**SHILKA** is the NATO code name for the Soviet ZSU-23/4 mobile anti-aircraft gun system. It started with a low profile, as an unknown quantity. But since 1973, **SHILKA** has gained a deserved 'reputation' — it's become a major anti-aircraft threat on the modern battlefield.

**SHILKA's** reputation is due to a combination of two technologies in one system: a fast-firing multi-barreled gun

arrangement, and an electronic target acquisition system. The weapon's abilities were proven conclusively on the battlefields of the 1973 Arab-Israeli War.

Because of the ZSU-23/4's importance to air defense doctrine, and its impact on Western military establishments, we'd like to take a closer look at the system itself, and how it is

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Figure 1 (Above): Two ZSU-23/4 Anti-aircraft Gun Systems, ready to fire, are seen guarding an area through which Soviet armor (here, T-55's) pass through on an approach march. Photo Credit: U.S. Army

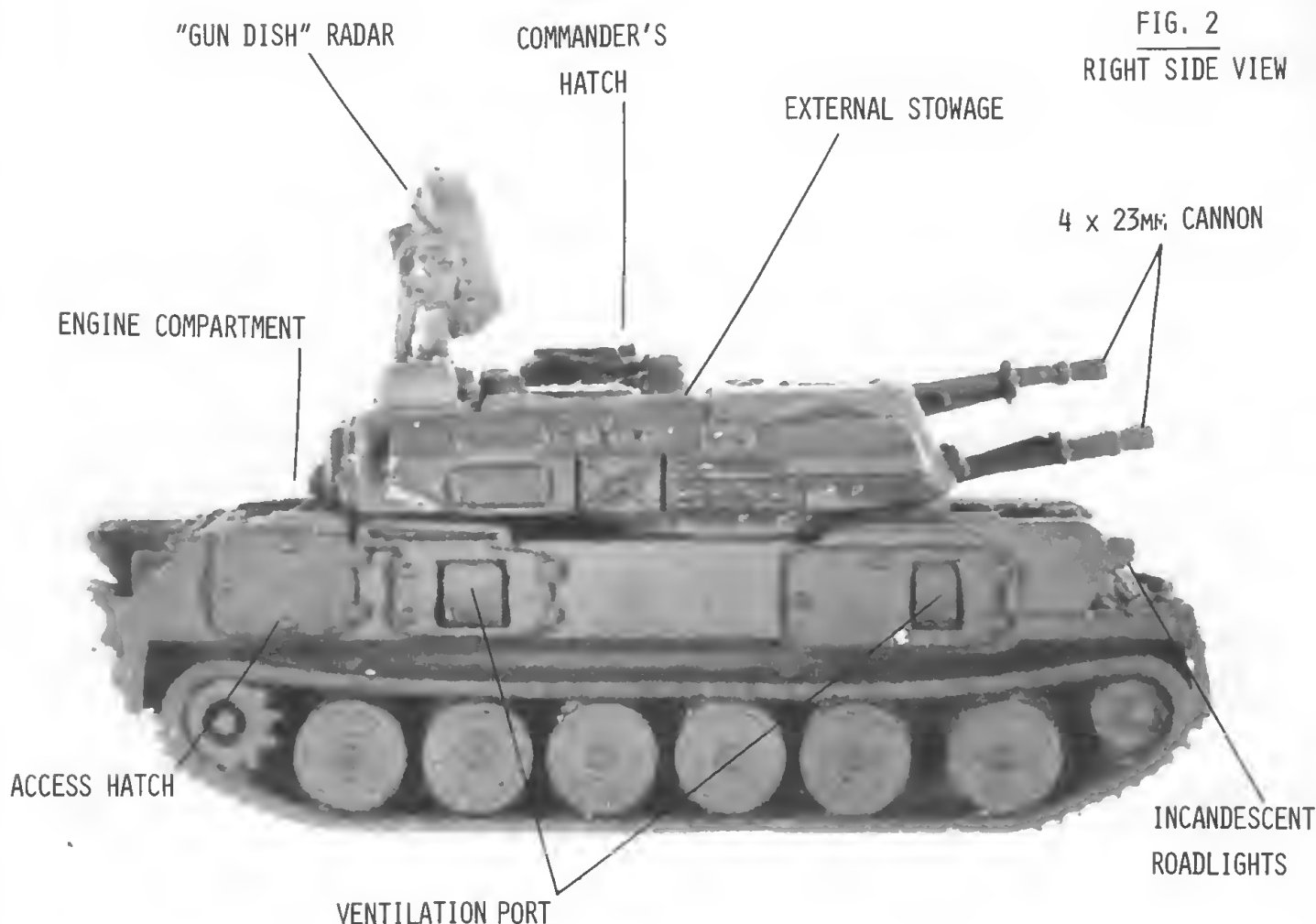


FIG. 2  
RIGHT SIDE VIEW

used. To help examination, photographs of the GHQ 1:285 scale miniature will be used for calling out details of the actual weapon system.

The only difficulty is that of dealing with any deployed Soviet weapon system. New information is constantly coming to light. The material in this article is that currently available to the defense industry as of 1 June 1976.

#### SPECIFICATIONS

System Basis	PT-76 Light Amphibious Tank
Crew	4
Weight	15,000kg (est.)
Length	6.3m
Width	2.95m
Height	2.25m (radar in travel position)
Track	2.67m
Ground Clearance	0.4m
Ground Contact	3.8m
Engine	V-6 in-line water-cooled diesel, 240bhp
Power/Weight Ratio	17.3bhp/tonne
Speed	44km/hr
Range	260km
Fuel Capacity	250 liters
Fuel Consumption	96 liters/100km
Transmission	Mechanical gearbox

#### Agility

0.479kg/cm  
2.8m  
1.1m  
30°  
1.07m

w/multi-clutch plate

Ground Pressure  
Maximum Trench  
Maximum Step  
Maximum Gradient  
Maximum Ford

#### Armor

15mm/55°  
15mm/0°  
10mm/15°

Glacis Plate  
Upper Hull Side  
Mantlet

#### Main Armament

4 x 23mm automatic cannon

#### Basic Load

260 rounds (observer estimate)

#### Elevation

+80°

#### Depression

-7°

#### Traverse

360°

#### Maximum Range

3000m

#### Maximum Effective Range

2500m

#### Radar

GUN DISH (NATO Code)

#### HISTORY & MISSION

The ZSU-23/4 made its early appearance in the Moscow parade of November, 1965, and was seen on maneuvers with Soviet, East German, and Polish ground forces in that same year. Its introduction during this period was something of a conundrum, since the Soviets were busy convincing the world that SAM missiles were to be that mainstay of Warsaw Pact field armies.

FIG. 3  
LEFT SIDE VIEW



As a result, **SHILKA** was viewed primarily as an interim weapon system, to be used until Soviet missile forces were up to strength. Since none of these weapons appeared in combat in Southeast Asia, its role in the developing Soviet air defense doctrine went unrecognized.

The Soviets supplied the ZSU-23/4, and many other systems, to Egyptian and Syrian armed forces during their build-ups after the 1967 Arab-Israeli conflict. And it was during the 1973 war that **SHILKA**'s role, and Soviet air defense strategy as a whole, became clear.

**SHILKA** is organic to the Soviet Army Group. Its mission is to provide low-level anti-aircraft cover for the armored and mechanized divisions within the group. It is part of a very tightly woven anti-aircraft net, which covers the entire 50km-long by 100km-deep Army Group Sector. It keeps pace with the Group as it moves forward. (See Figure 1)

This ground-based air defense net is composed of both gun and missile systems, with a total of 18 batteries of various SAM's, 38 troops of mobile anti-aircraft guns, and 42 batteries of towed anti-aircraft weapons.

In this big umbrella, **SHILKA** takes the burden of low-level defense. Thirty-two troops of ZSU-23/4's, a total of 128 quad-gun vehicles, are deployed throughout the Army Group formation, usually in conjunction with SAM missile batteries. This way, **SHILKA** becomes responsible for defense of the SAM's against low-level air attack.

The Soviets used this system in their training of Egyptian and Syrian army units prior to October 1973. A more ideally suited weapon system could hardly have been found to counter the well-known Israeli Air Force tactics; **SHILKA** showed up prominently in the carefully through-out Egyptian Army dispositions after the three army groups crossed the Suez at the very start of the war.

(In fact, the initial effects of Egyptian air defense were so marked that the anti-aircraft net later became a hindrance. The Egyptians' lack of responsive movement during the subsequently successful Israeli counter-offensive has been laid at the door of the Egyptians' dedication to staying under the relative safety of their air defense umbrella.)

Before we examine **SHILKA**'s role in the October 1973 War, a look at the vehicle itself is in order.

#### SYSTEM DESCRIPTION

**SHILKA** is based on a modified PT-76 light tank chassis, part of a vehicle family that the Soviets developed in the 1960's. It shows that standard Soviet practice of adapting well-proven mechanical systems to new weapons and roles.

At the same time, because of chassis, superstructure, and turret modifications, **SHILKA** has little or no amphibious capabilities left. (On some photographs, a fording (or splash) board can be seen across the hull front.)

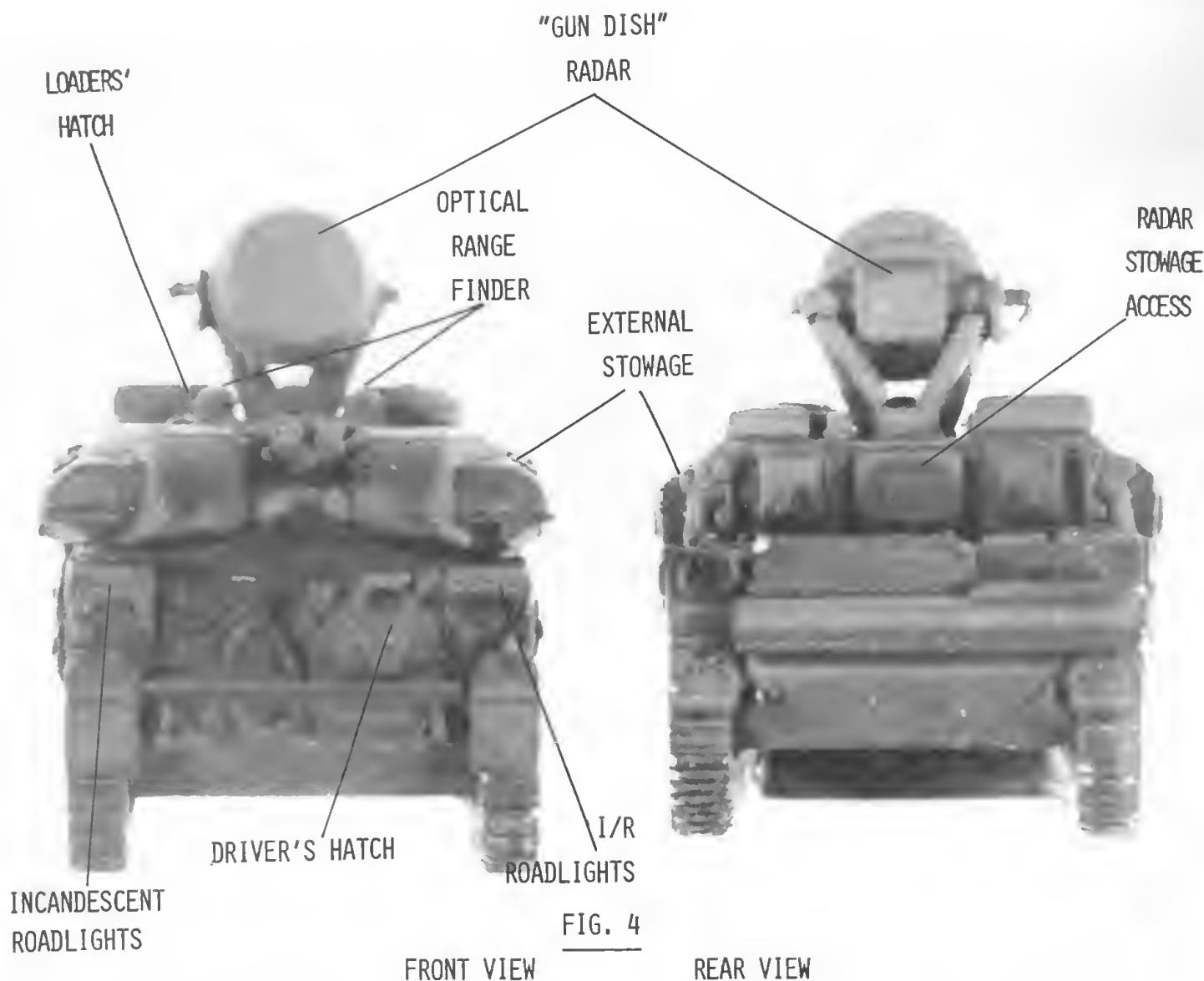
One major change has been the increase in space between the first and second roadwheels (see Figure 2); a change not made on other PT-76 based vehicles, such as the BTR-50.

The driver sits in the hull, on the left side of the vehicle (see Figure 4). His position, behind a glass windscreen, is fully covered by a metal hatch.

The two main features of the ZSU-23/4 are the low, box-like turret, and the very distinctive radar dish antenna. With external stowage, the turret is slightly wider than the vehicle — in almost eleven years of service, there have been a number of modifications. Our illustrations show the turret model that is currently deployed.

The vehicle commander's hatch is on the left side of the turret. On this system version, it opens forward; earlier versions' hatches opened to the left. The commander himself





rides rather high when **SHILKA** is not buttoned-up. Almost two-thirds of his body is outside of the turret itself. Behind the commander's hatch is located the radio antenna. (see Figure 5)

The hatch on the right side of the turret is for the two loaders. It opens to the rear. In front of the hatches are two humps. These are covers for what appears to be an optical range-finding system. While not present on earlier versions, the vehicle in Figure 1 shows these covers in the open position. An optical range-finder wouldn't be necessary or even useful in **SHILKA's** primary anti-aircraft role. However, such a system could be used for ranging ground targets, an assumed secondary role.

The distinctive radar arrangement led NATO to code-name it **GUN DISH**. In Figures 1 through 5, it is shown deployed. For traveling, the radar is turned to the rear, folded down, and locked behind the turret. The hatch at the rear of the turret has been called a 'cartridge ejection port'; it is more likely part of the lock-down mechanism for the **GUN DISH** radar, with the hatch itself lowering down to accept a matching part of the radar mechanism.

Both radar and guns have been seen with travel covers on them. The turret sides bear various external stowage compartments. The remaining features of the superstructure, rear deck, and hull have been called-out in the accompanying photos. It can be mentioned that the front hull roadlights are of two types; Infra-red on the left and incandescent on the right.

#### GUN SYSTEM

The 4 x 23mm rapid-fire guns are inset into the forward

part of the turret. They're slaved together, and the arrangement allows maximum elevation. The lower gun pair is set wider apart than the upper pair, resulting in a 1.83, axis-of-bore figure. All barrels are fitted with flash-hiders.

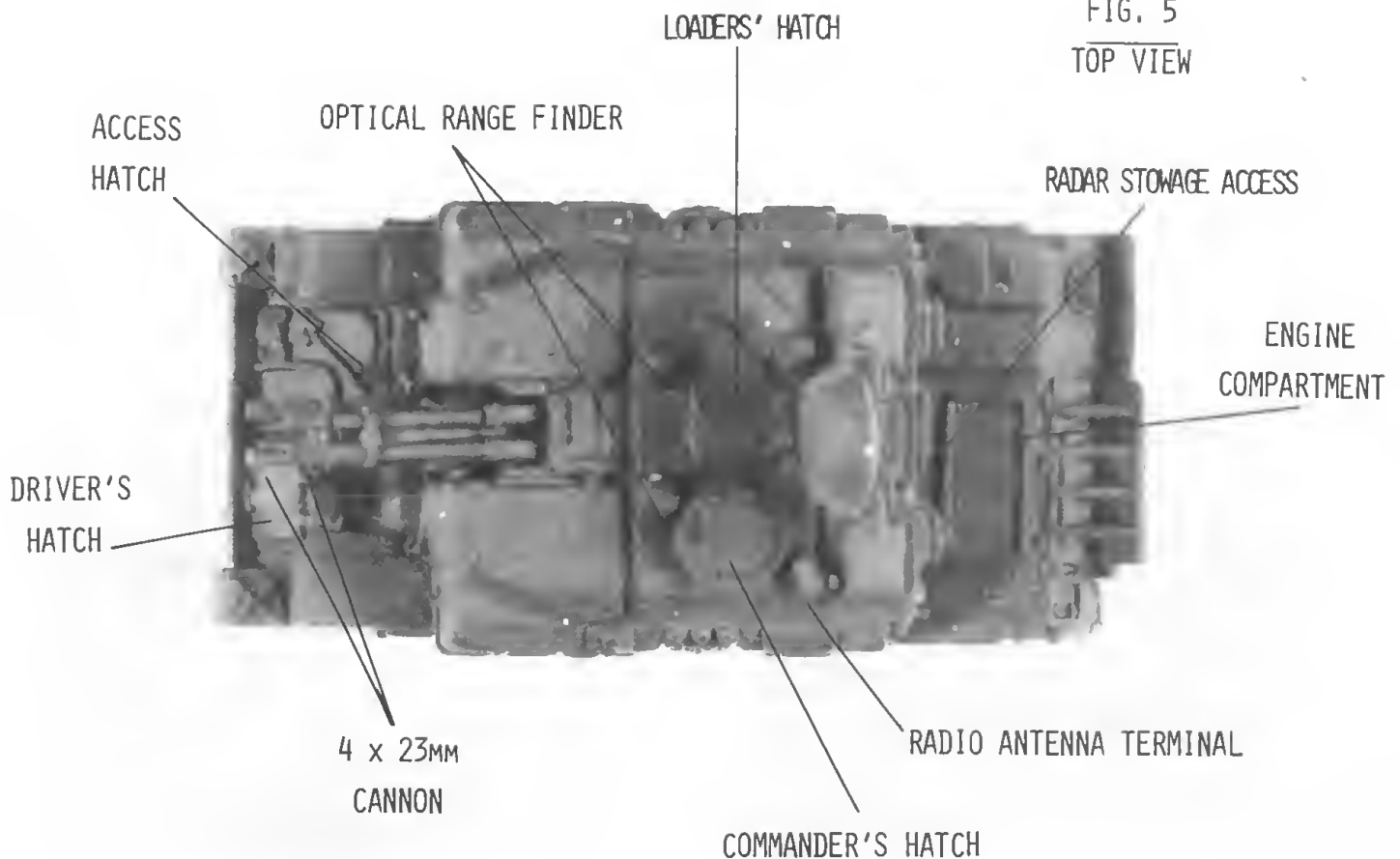
The system is based on the well-proven Soviet ZU-23 design. It is a dependable, high-velocity, gas-operated weapon with a high rate of fire. In addition to its use in the ZSU-23/4, it is used in a twin-gun towed configuration, the ZSU 23/2 — 19 batteries of which also appear in the Soviet Army Group Table of Organization. Some specifications of the gun are as follows:

Cartridge	23mm x 154mm
Total Length	0.26m
Barrel Length	0.18m
Barrel Change	Yes
Feed System	Belt*
Locking System	Vertical Sliding Block
Muzzle Velocity	930 m/sec
Practical Rate of Fire	200 r.p.m.
Cyclic Rate of Fire	1000 r.p.m. (per gun) 4000 r.p.m. (total system)

\* The belt-feed is characteristic of the ZU-23. The ZSU 23/4 system uses magazines, according to one observer.

The ZSU 23/4 **SHILKA** fires both HEI and API ammunition, each type of round weighing approximately 0.2 kg. The combination of high cyclic rate of fire and good maximum effective range (2500m) permit effective anti-aircraft fire. It has been noted, however, that **SHILKA** carries only 260 rounds of ammunition, 65 for each gun magazine. This means that

FIG. 5  
TOP VIEW



**SHILKA** could fire a maximum of three short bursts against an incoming target, and possibly another burst as the target recedes — a few seconds' fire without resupply. While this seems to be incredibly low, the targeting capabilities of the system appear to be such that a very brief burst of fire can in fact disable its target.

#### RADAR SYSTEM

That **SHILKA** is a very effective anti-aircraft system has been proven. So a great part of the credit must go to its **GUN DISH** radar system.

The efficiency of Soviet Electronic Warfare (EW) systems was one of the Yom Kippur War's greatest surprises. For the Israeli Air Force, it was a very bad surprise indeed, since it was used extensively to counter the same kind of air-war tactics the IAF had used so successfully in 1967.

**SHILKA's GUN DISH** is a broadband radar. It works in a wide band of electromagnetic frequencies, from the X-band to the lower K-band, to detect the electronic emanations of an incoming — an attacking — aircraft. What the radar picks-up is known as the targets 'signature'. **GUN DISH** was admirably suited to detect the signatures of IAF aircraft in low-level attack modes.

The **GUN DISH** radar is connected to a fire control computer. Both the quad 23mm guns and the turret itself are slaved to this computer, which computes the data picked-up by **GUN DISH**, interprets it, rotates the turret and elevates (or depresses) the guns, and fires the guns at the instant of maximum effectiveness.

A supporting Egyptian tactic was of further help: forward visual observers signalled back to their batteries the approach or angle of attacking Israeli aircraft. This permitted combat crews to roughly align both radar and turret, prior to actually acquiring the target. This method shortened acquisition time immensely, and enhanced hit probabilities.

Since the Israelis were not prepared for electronic warfare, **SHILKA** batteries and other radar-directed weapons systems were immensely effective in the early days of the 1973 conflict.

#### HOW EFFECTIVE WAS SHILKA?

Observers' figures indicate that the Israeli Air Force (IAF) suffered 95% of its losses to ground-based anti-aircraft fire. In the first flush of the 1973 conflict, it was reported that most of these losses were due to SAM missile fire — the same way the U.S. lost so many aircraft in Southeast Asia.

In fact, only 40% of the IAF losses can be laid to SAM's. The remaining 55% fell to anti-aircraft guns, of which **SHILKA** troops formed the majority.

As we mentioned, the ZSU-23/4—**GUN DISH** combination was ideally suited to counter Israeli tactics. Flying low-level ground attack missions, just as in 1967, IAF pilots became easily-acquired, easily-dealt-with targets for Egyptian and Syrian **SHILKA's**.

It was not until the IAF changed its tactics to deal directly with the threat posed by these weapons that Egyptian and Syrian anti-aircraft batteries began to lose their effectiveness. The IAF began using stand-off weapon delivery tactics, similar to those used by the U.S. Air Force in Viet Nam; the IAF struck at the anti-aircraft positions themselves, rather than trying to get at the armored formations they were protecting.

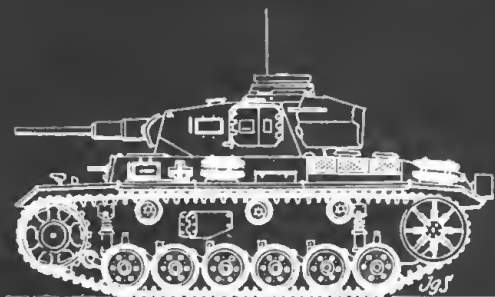
And finally — and most important — the IAF began using ECM (Electronic Countermeasures) hurriedly shipped to them by the U.S. Air Force, to foil anti-aircraft radar systems; and this allowed the aircraft to close with enemy positions on the ground.

#### CONCLUSION

The ZSU-23/4 **SHILKA** weapon system has, in fact, gained that reputation we were discussing at the beginning of this

Continued on Page 44

# ARMOR MODELS IN REVIEW



Revell/Italaerei's German Tank, Panzerkampfwagen I., Ausf. B, Sd.Kfz. 101, in 1:35th Scale...

Reviewed by S. R. Cobb

'It's finally come out, the long-awaited German Panzer I.' So, my feelings were expressed when I first heard that Italaerei was planning this new model. I think that all German 'armor nuts' will agree with my statement; most enthusiasts I have talked with have been waiting for some manufacturer to give the hobby what's been missing all these years. Italaerei's latest model is being marketed in the United States by Revell, and by the time this reaches our readers, the kit should be readily available.

Revell/Italaerei's 1:35th scale model of the German Panzer Ib. is superbly molded in a dark gray plastic, with tracks molded in a steel-gray color. The kit consists of 90-odd parts and includes one standing miniature figure.

I have compared the parts in Italaerei's kit with drawings I prepared some time ago for this magazine, and I am pleased to indicate that the kit measures out in all respects. My only complaints are over the lack of interior detail, and one of the markings schemes. The markings shown for a vehicle involved in the Spanish Civil War should be for a Panzer Ia., but not a Panzer Ib. This can be verified by reference to available photographs.

There being no other faults that I could find, I should probably mention some of the extra fine features which, in my mind, make this model stand-out as the best armor model of 1976! First of all, complete external stowage is provided. In addition, vision ports can be opened, as can be all hatches. Incidentally, these parts include inside detail, making an open installation even more accurate. Optional parts are included to convert the tank to 'desert' running. The antenna is molded separate from the antenna channel, and with a little effort, it can be made workable. The standing figure is even given a pipe, for his smoking pleasure. Four markings schemes are provided: one for the invasion of Poland in 1939, one for the invasion of France in 1940, and one for service in North Africa in the period from 1941-42, as well as the one for the Spanish Civil War mentioned earlier. I would also like to compliment Italaerei for their very comprehensive instruction sheet; the drawings are especially clear and the instruction sheet is understandable in four languages.

To finish this review, making it short and sweet... 'This is the model kit of the year'.

ROCO Minitanks: 1:87th Scale Decal Sheet Z-276

Reviewed by James Steuard

Recently made available from ROCO, the people that produce the HO Scale 'Minitanks' range, this new product is a 4 1/4 by 6 1/2 inch sheet containing over 250 small decals which are in-scale with the Minitanks. The sheet contains decals for American, British, Russian and German miniature vehicles.

Color and registration are excellent on these decals, and sufficient decals are presented to mark quite a number of miniautres. While many of the decals are totally accurate, there

are a number of persistent errors in language which spoil a number of decals. For example, 'Explosive' placards are misspelled without the final 'e'. American bumper marking are nicely in scale and crisply printed, but battalion-level markings are totally missing (there's plenty of company markings, and higher unit markings for the 1st Armored and 2nd Armored Division and 7th Army). British markings are a nice mix of formation signs and unit serial numbers, with a few turret numbers thrown in. There are seven sets of T numbers, two RAC flashes, two sets of postwar license numbers, etc. Russian markings consist of red stars (with and without white hammer-and-sickles) and Guards insignia. Four turret diamonds are included. German markings consist primarily of divisional tactical symbols, although there are included a number of crosses, license plates and flags; the more useful turret numbers are totally missing.

All told, this decal sheet offers good value for the money, if you have a good source of information on where the various items should be placed on a model. No instructions are provided on how to accurately dress-up a model. The lack of any form of instructions is a major disappointment, but the decals themselves are nice and are worth the price.

Marui's Mercedes-Benz Typ. G-4 Garmen Stuff (sic) Car in 1:35th Scale...

Reviewed by S. R. Cobb

The Mercedes-Benz G-4 was a large 6-passenger, heavy staff car with six wheels (4 of which were powered), which was very well liked by Hitler. The vehicle was intended for use by high Nazi party and German Army officials. The car was specially constructed with an armored body, in order to protect the passengers from possible assassination attempts during parades, trips or during reviews of field maneuvers. A total of 59 of these vehicles were produced in either of two versions: as a passenger carrier, or as a communications vehicle which was used to communicate with higher headquarters during field trips.

This unusual Mercedes-Benz vehicle has been faithfully depicted in a model produced by the new Japanese Marui company. The kit contains 55 parts molded in black plastic, 12 parts in white, 29 chromed parts and 9 parts in clear plastic. Six figures are provided to animate the completed model. All parts are relatively flash-free. Unfortunately, Marui has included gears and a motor for a battery-powered, motorized 'toy' car. The instruction sheet in the kit has easily-understandable exploded views and construction is easy and straightforward.

Now, to the critique... Good points include excellent tires with realistic tread. In addition, I must compliment the ease of affixing the wheels without cement. Parts in the kit fit well together. I wish I could find more features that I liked, but... The greatest fault with this kit involves Marui's attempts to provide motorization. This utilizes a 5/8-inch by 2-inch box to hold batteries, and a 3/4-inch by 1-inch box to hold the gears. Unfortunately, when these boxes are installed, there's no room left over for a rear suspension or a differential housing for the rear wheels. In addition, the kit lacks brake or accelerator

pedals, and there is no fire wall between the engine and passenger compartment. This is rather unnerving as you can look straight through the completed model, all the way to the radiator! I had some difficulty with some of the chromed parts; these could have been laid out better, for when a part is removed from the 'tree', the chrome finish usually got damaged.

Even with its faults, this kit was welcome as it depicts an unusual vehicle. Since this car has been a favorite of mine for years, I welcomed the release of it by Marui. However, readers are cautioned, as a good deal of work must be done in order to make a good replica of Hitler's Mercedes-Benz G-4 Staff Car.

**AHM's German Sd. Kfz. 7/1 Halftrack Quad 20mm AA in 1:72nd Scale...**

Reviewed by Graham Peck

The German 8-ton halftrack prime mover has long been a favorite of German military vehicle lovers, and the **Flakvierling** armed version is an interesting modeling variant. AHM's new model of the **Sd. Kfz. 7/1** is an entertaining model which captures the feel of the original vehicle.

AHM's 8-ton Halftrack model is cleanly molded in a gray-blue plastic with vinyl steel-gray tracks. The kit includes the vehicle, the four-barreled anti-aircraft gun, and seven members of the vehicle and gun crew. AHM's kit assembles easily, following the clearly-outlined steps in the instruction sheet. Assembly follows three stages, putting together first the chassis, then the body and then the **Flakvierling**. Be careful in removing parts from the trees; use a sharp knife or razor blade to prevent damage to the fragile parts. Most parts in our sample kit required some clean-up with a sharp blade and/or file. The shield on the anti-aircraft gun is of the abbreviated type, and can be modified by adding sheet styrene 'wings' on each side, either folded or extended. The magazine housings on the guns are empty, as are the magazine racks at the base of the gun mount. Make fourteen magazines from thin sheet plastic, and install them for increased accuracy. There are a number of other detailing tricks which can make this model more realistic; most of these will be self-evident with a little thought by the modeler.

I enjoyed putting our sample kit together. I think the end-product looks very realistic and is a welcome addition to my small vehicle collection.

**AHM's HO-AFV Series No.9 Jagdpanzer III. & Barricade in 1:87th Scale...**

Reviewed by Thomas Levin

Until fairly recently, 'kits' in HO scale were virtually non-existent, and modelers (like myself) who wished to work in this scale had to modify, convert and/or work with Minitanks. Gradually this situation has changed, and some kits are now on the market. The AHM company has recently released a number of 'paired' HO Scale kits (containing two separate models) and the subject of this review is one of this series (#9 in fact). The kit depicts a German **Sturmgeschütz III., Ausf. G** assault gun and also contains a number of steel anti-tank obstacles, wooden boxes and barrels.

The **Sturmgeschütz III.** model is molded in light gray plastic and consists of nine parts. The kit is over-simplistic and detail suffers through molding; its always easier to obtain better detailing when small parts are cast separate. When road wheels, drive sprockets, etc. are all cast integral with side panels, it is very difficult to achieve good, crisp detailing. Tracks are separate, flexible vinyl strips, which do add better detail when compared with the equivalent Minitanks model. In terms of modeling accuracy, this kit is not a totally accurate representation of the real vehicle; it looks more like a copy of the Minitanks model which was also far from accurate. A short-barreled, optional gun is provided to permit 'back-dating' of the kit to an earlier variant, but the 'G' hull never appeared with the short-barreled weapon. If you built the kit with a short barrel, you are creating a model of something that never existed...

I wish I could recommend this kit, because HO scale kit manufacturers deserve to be encouraged. However, the lack of crisp detail, the number of scale errors, and the less-than-

accurate model, coupled with the few number of parts and the toy-like appearance tend to turn me off. The kit might be valuable to provide wargaming pieces, but to a modeler, it requires substantial work to make an acceptable model.

**Tamiya's British Ambulance Land Rover 7 in 1:35th Scale...**

Reviewed by James Steuard

Following closely on the heels of their SAS 'Pink Panther' Land Rover Jeep, Tamiya has released a model of the Land Rover ambulance, a vehicle currently in use with the British Army. This model logically uses identical parts from the SAS Jeep kit, along with quite a number of new moldings, and the result is a well-done model of a typical British softskin. Since the vehicle is contemporary to the Centurion and Saladin, it would make a logical companion to these other Tamiya models in a diorama.

The Tamiya **Land Rover 7** kit consists of 98 parts, cleanly molded in dark olive green plastic, with all window areas in clear plastic. Assembly is easy when following the exploded assembly drawings in the instruction sheet. The only difficulty I encountered with a trying to determine the colors Tamiya recommends painting various parts. Our sample kit, provided by the manufacturer, went together well. Virtually all parts were totally flash free and beautifully molded. The model has a partial interior, made necessary by the fact that the rear truck doors can be cemented in the open position. Take a little time here to add packs, medical kits, and 'clutter' and you can make this kit come alive. With a little effort, you could hinge the cab doors, and superdetail the cab interior. Actually, most of the detail is already there; all it takes is careful painting and maybe some 'glass' instrument faces!

Also included in the kit is a seated driver, along with a standing medic, two stretcher bearers carrying a stretcher, and a wounded soldier lying in it. All figures are multi-piece (except for the wounded figure) and may be animated easily, interchanging the separate arms and heads. No individual weapons are furnished. Decals provided in the Land Rover Ambulance kit are of excellent quality with good registration, excellent printing and flat finish. One markings scheme is illustrated in the instruction sheet; this shows a three-color camouflaged vehicle in England or on the continent. No unit serial numbers, formation signs or bridge markings are provided, though, and you will probably have to supplement the existing decals with others.

This is an excellent model which is well up to Tamiya's high current standards. The finished model is accurate and is thoroughly realistic. It can be recommended to any vehicle enthusiast who is interested in contemporary vehicles.

**ROCO Minitanks's Opel-Blitz A 3-ton Truck [with Canvas Top], in 1:87th Scale...**

Reviewed by Thomas Levin

This new offering from ROCO is a model I've been waiting for for over ten years! The **Opel-Blitz** 3-ton truck is synonymous with wartime Germans supply trucks; it was produced in large numbers and was used in all climates and in all theaters of action. All these years, I've had to simulate the **Opel** by using ROCO heavy **Mercedes** chassis with converted and scratch-built superstructures. All that has now been changed...

ROCO's new **Opel-Blitz A** is a beautiful little model which almost exactly duplicates the original vehicle. It comes in a blister-pack, fully assembled but not cemented together. The truck itself consists of three assemblies: the cab and chassis, the wooden box body (with seats and hinging tail gate), and the canvas top. All of these are beautifully detailed. Eighteen small accessories are also included with the kit on a separate sprue tree; these include tow hooks, shovels, picks, jacks, lights and balkout light fixtures. Parts do need some cleaning up, as there's a moderate amount of flash. Since the truck's box body and canvas top are separate, it's very easy to convert the kit chassis into a van-type truck, or any one of several different variants built on the common **Opel-Blitz** chassis. For an easy conversion, the canvas top may be left off. In my mind, this flexibility of assembly is a definite plus! In terms of minor

Continued on page 31



# The German Panzer II.D & Variants

During the early years of German armored vehicle development, manufacturing facilities experimented with virtually all types of armored vehicle suspension, from leaf and coil springs to overlapping road wheels with torsion bars. In fact, various versions of every pre-war German tank were created with differing suspensions in efforts to improve speed and running qualities. The subject of this issue's centerspread drawings illustrates one such 'experiment' which actually went into production and saw combat.

In the pre-war years, the backbone of the German *Panzer-Divisionen* was the *Panzerkampfwagen II* light tank. Mounting a 2cm main gun, this vehicle was Germany's first more-or-less modern tank; it had good speed, adequate armor for the time, and carried a relatively potent cannon. This vehicle was introduced into service in 1935, and production continued into 1941. In 1938, a major redesign effort was ordered in an attempt to increase road speed and performance. This new vehicle, designated as the '*Panzerkampfwagen II (2cm)(Sd. Kfz. 121), Ausführung D and E*', was produced under a plan to create a so-called 'Fast Fighting Vehicle', in which road speed could be increased substantially without increasing engine size or output. While the superstructure and turret of this vehicle resembled earlier (and later) *Panzer II*'s, the suspension was a radical departure from the earlier quarter-elliptic springs and small-diameter road wheels. The new vehicles were the first German tanks to be equipped with a torsion bar suspension, coupled with a 'dead' track, *ala* Christie. The vehicle, as shown in the accompanying drawings, had four large diameter road wheels, none of which overlapped each other (as was typical later on torsion bar equipped German tanks). The resulting light tank weighed more than earlier *Panzer II*'s, nearly 10-tons. In spite of the increased weight, the top speed was increased from 40 to 55 kilometers-per-hour. However, contemporary reports show that cross-country performance was not increased, and cross-country ride was actually less smooth than the quarter-elliptically sprung variants. Accordingly, the project was deemed to be of marginal success (in this form) and production was halted. However, during 1938, nearly 250 of these 'Fast Tanks' were produced, entering service with German armored units.

By the end of the French campaign, it had become obvious that the German *Panzer II* was obsolete. It lacked firepower; its 2cm cannon could not effectively compete with enemy tank guns which had better range and penetration. In addition, its light armor was too thin (only 35mm) to protect the tank and crew from hostile fire from larger weapons. Even though obsolete, it took time for a replacement vehicle to be produced in sufficient quantities, and accordingly, the *Panzer II* soldiered on. Some of the 'standard' *Panzer II*'s were converted into amphibious light tanks, for the proposed invasion of England. Numbers of the torsion-bar equipped *Ausführung D* and *E* tanks were converted into flame-throwing tanks during this same time period, being designated as the *Flammpanzer II*.

The *Flammpanzer II* represented quite a departure from the conventional light tank. Crewed by a two-man crew, consisting of a Driver and a Commander/Gunner, this variant had only an abbreviated turret containing one machine gun. The flamethrowers were mounted on the fenders, normally firing forward as the tank advanced with its thickest armor toward the enemy positions. The flame-throwing weapons could be traversed through an arc of 180° to each outboard side, in order to attack positions from the flanks. Much of the tank's internal space was taken up by fuel tanks for the flamethrowers; this fuel consisted of thickened gasoline which was expelled by gaseous nitrogen under pressure. The fuel was ignited as it left the flamethrower tubes. Sufficient fuel was carried for approximately 80 bursts, each of 2 to 3 seconds duration. As the nitrogen was of fairly low pressure, the flame range was limited to 35 meters. Some sources indicate that approximately 100 of the former *Panzerkampfwagen II, Ausführung D*'s were converted into this role. It appears that the remainder of the vehicles (the ones

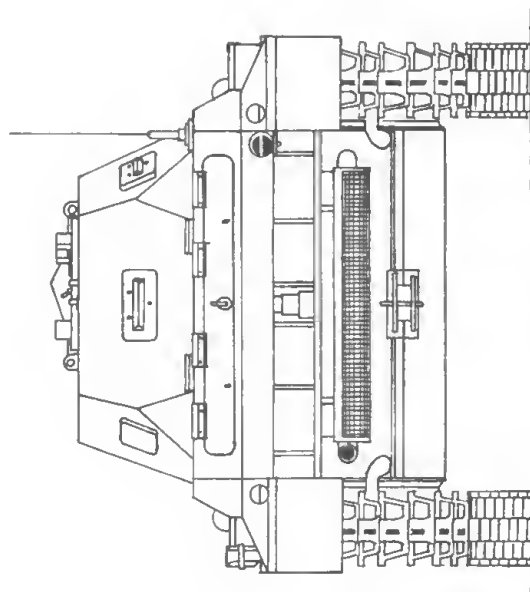
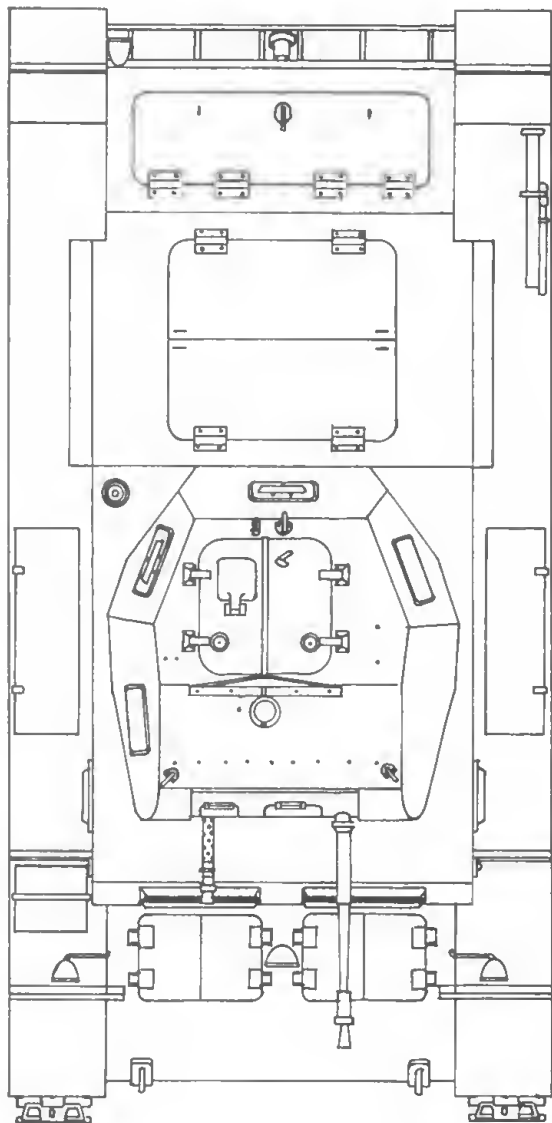
surviving combat) were retained as tanks and then converted into an anti-tank gun version, as indicated below.

Although the *Flammpanzer II* lacked heavy armor protection, and suffered from lack of flame range, it was used in this capacity until war's end. Better flame-throwing vehicles were created, in particular the *Flammpanzer III*, and the *Sd. Kfz. 251/16* armored halftrack, but the need for these specialized vehicles was greater than the supply.

In terms of employment, the *Flammpanzer II* saw combat in two different types of units. The first of these, the *Flammpanzer-Zug*, was organic to several (but not all) of the German *Panzer-Regiments* at the regimental command level. These five-vehicle platoons could be employed in support of other tank/armored infantry operations at the discretion of the regimental commander. The second type of unit was the corps-level or army-level, separate Flame unit, either of company or of battalion size. These units were attached for operations to various corps or armies, and could be assigned to other units which required their specific type of combat. Little has been printed on this type of unit, and it is hoped that a future article can be prepared which will show details of these *Flammpanzer* units as well as their service records...

The remaining *Panzer II, Ausführung D* and *E* light tanks were actually the first of the *Panzer II*'s to become available for conversion to self-propelled gun carriages. The first of the conversions on the *Panzer II* chassis used the captured Russian 76.2mm anti-tank guns; this vehicle was designated *Pz.Sfl. II. fur 7.62cm Pak 36(r) (Sd.Kfz. 132) 'Marder II.'* This weapons system was produced by Alkett, and by May of 1942, all available 150 tank chassis had been converted. As the demand was far greater than the supply, other versions of the *Panzer II* were next converted to this type of weapon system, using a similar (but not identical) superstructure. It should be stated that *all* of the surplus *Panzer II, Ausführung D* and *E* vehicles were either converted to *Flammpanzer II*'s or *Marder II*'s. It appears that, in some cases, some flamethrower vehicles were also converted to anti-tank gun self-propelled mounts; these chassis became available when sent to the rear for major repairs.

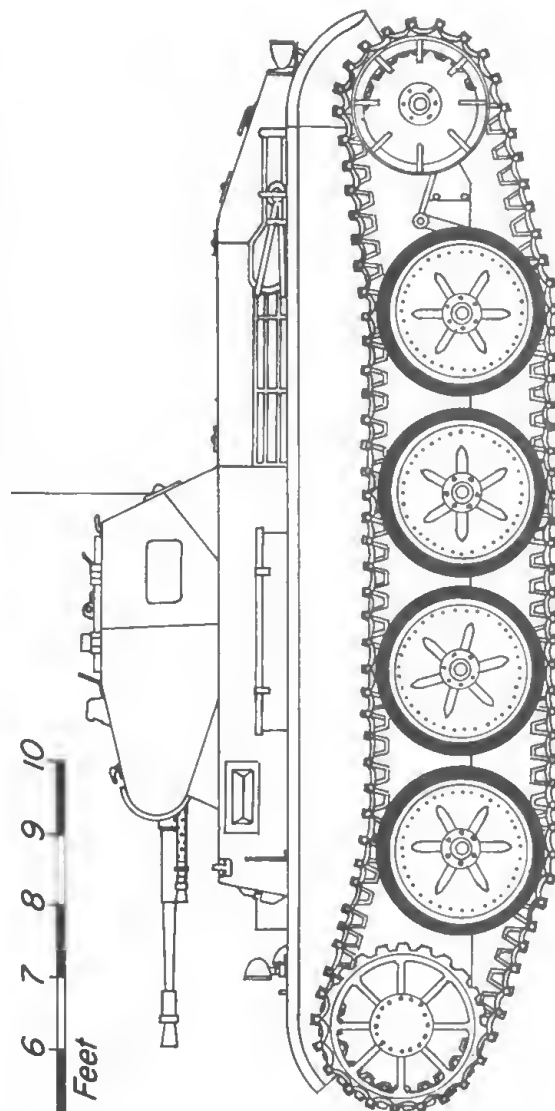
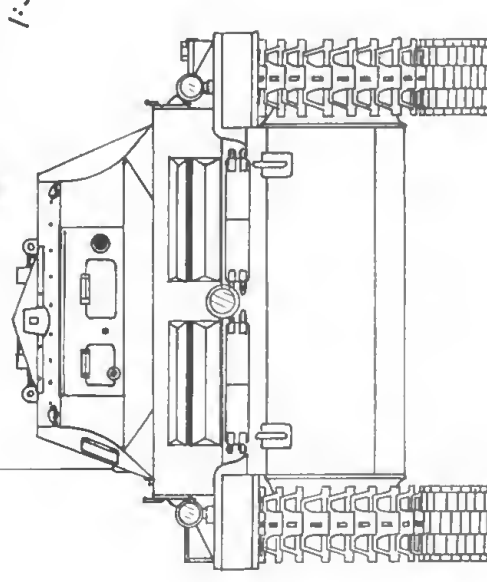
We should also mention in this article the major effect caused by the *Panzer II, Ausführung D* and *E* upon German armored vehicle development. The German search for a fast tank was only marginally satisfied by the torsion-bar *Panzer II*, however, this vehicle pointed out the way to achieve the desired effect, through another major re-design. In this new effort, torsion bars were retained as the correct form of suspension, however, the torsion bars were moved closer together, being accommodated by overlapping the road wheels. This technique provided better springing (through more torsion bars) and also permitted high speed by using the same dead-track system as on the earlier *Panzer II*. By the time this newer form of suspension was worked-out, the German Army's requirement for a fast tank had been modified to a need for a fairly light armored reconnaissance vehicle with good speed and adequate weaponry. The resulting light tanks took several forms: first was the *Panzerkampfwagen II, neuer Art (VK 901)*; this was subsequently modified into the *VK 903*, which had a different turret mounting a rangefinder as well as advanced forms of communications devices. In all, 75 of the *VK 901*'s were manufactured, while 6 of the experimental *VK 903*'s were produced. The experience gained in producing these two vehicles resulted in development of the *Panzerkampfwagen II, neuer Art (VK 1301)*, which was standardized as the *Panzerspähwagen II (2cm) (Sd. Kfz. 123) 'Luchs'*. This new vehicle had a weight of close to 13-tons, and was fitted with a more powerful 6-cylinder, 180-horsepower engine. This powerplant gave the '*Luchs*' a top speed of 60 kilometers-per-hour. A total of 130 vehicles were manufactured; the first 100 were armed with the 2cm gun, and the remaining 30 vehicles were armed with a 5cm cannon. Pictures of this latter vehicle are quite rare. In actuality, the development of the '*Luchs*' carried

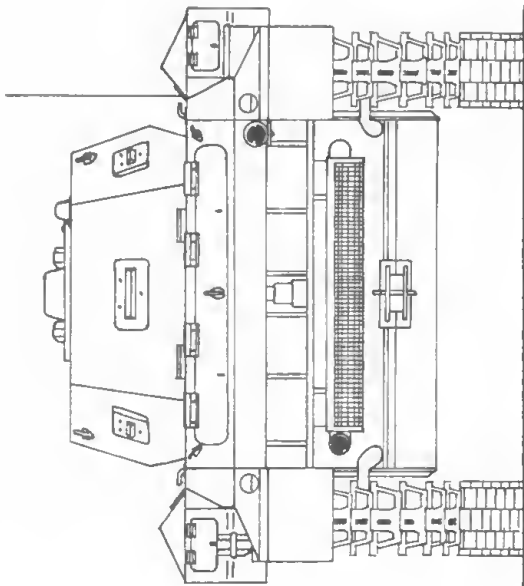
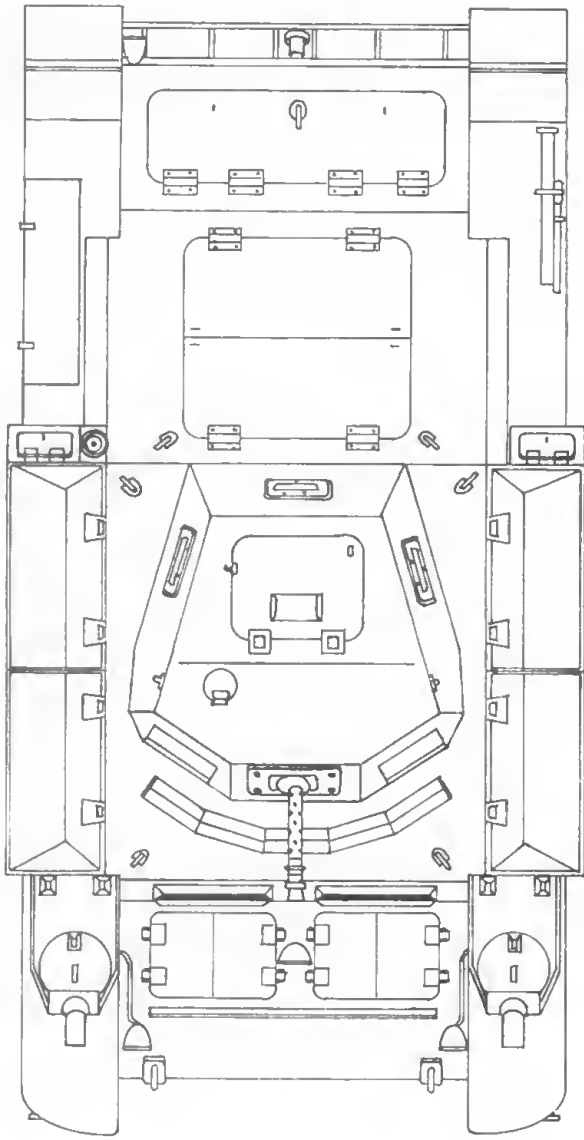


# PANZERKAMPFWAGEN II., Ausführung D

DRAWN BY S. R. COBB

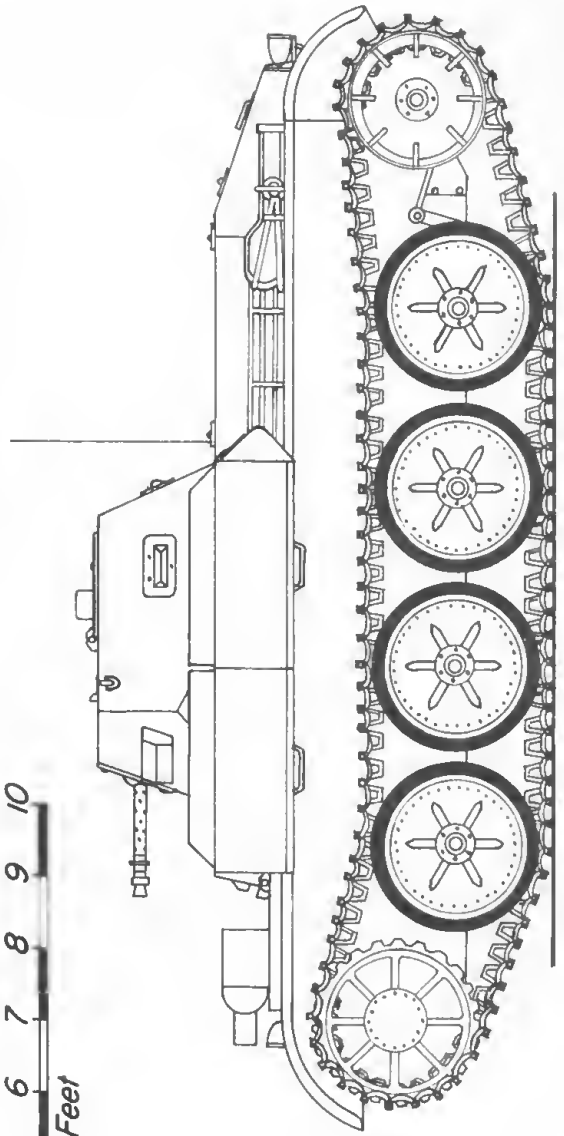
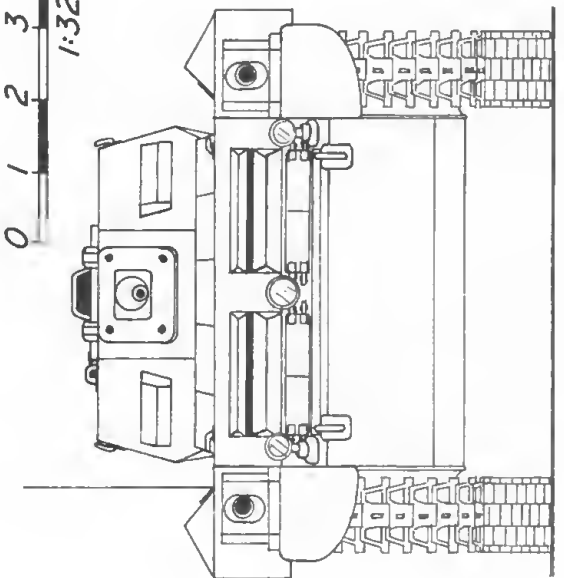
0 1 2 3 4 5 6 7 8 9 10  
1:32 Scale in Feet





# **FLAMMPANZER II., Ausf. D**

*DRAWN BY S. R. COBB*



# ARMOR IN PICTURES

'Armor in Pictures' is a photographic article series to display reader-submitted material on military vehicles and associated models or dioramas. Readers are invited to submit their photographs of vehicles or models for inclusion in this series. Photos should be packed securely, preferably between sheets of cardboard to prevent folding and/or damage, and sent to *AFV-G2*, P. O. Box 820, La Puente, CA 91747, Atten: 'Armor in Pictures'. Credit will be given in the photo caption for all photos published and all photos will be returned after

publication, along with a copy of the magazine in which the pictures appear.

'Armor in Pictures' is also designed to serve readers as a forum for photo requests. If there's a particular photo reference needed, for modeling, for data, for accurate markings, etc., drop *AFV-G2* a note (at the above address) to let the staff know what is required. Our staff will attempt to provide the photos that the readers wish to see, and we'll also provide a list of requested photos that readers are searching for....



The two photos above show North Korean armored vehicles. In this case, they are not ex-Soviet T-54's, as one might expect, but are instead Chinese T-62 Light Tanks, which quite closely resembled the larger Russian vehicle. Note the size relationship

of the 12.7mm external machine gun, as well as the main gun tube and its bore evacuator. These pictures were taken in Pyongyang, North Korea, during a parade on June 4, 1972. The photos were provided by John A. Loop.



The two photos above illustrate two of the operational, restored tanks located at the Patton Museum, Fort Knox, Kentucky. These pictures were taken on July 4, 1973 by Dan Cyr of Orchard Beach, Maine, during one of the 'Living Armor' demonstrations. The vehicle in the left picture is an M24 Chaffee Light Tank, while the right tank is an M4A3E8

Sherman Medium Tank. Note the World War II. period uniforms on the tankers and ground guides. Markings on the Sherman indicate the 4th Armored Division's 37th Tank Battalion, while the M24 is marked for the 45th Cavalry Reconnaissance Squadron.





Although not tremendously clear, the photograph above is of interest as it shows the U.S. Army's copy of the Renault FT light tank of World War I fame. Designated as the 'Six Ton Special Tractor', this vehicle substituted American components in what was otherwise a French design. During the 1930's, this vehicle was assigned to Infantry Tank units, and the markings

on the turrets of the tanks shown above indicate assignment to the 1st Tank Regiment (Infantry). The vehicle in the foreground was assigned to Company C, while the second vehicle came from the First Battalion Headquarters. Photo from the S. R. Cobb Collection.



The photo on the left, above, shows American soldiers looking-over a captured German anti-tank gun; in this case, it's identified as a former French 75mm M1897 gun mounted on the carriage of the 5cm Pak 38 anti-tank gun. Such conversions were common, using what was otherwise a useless, captured weapon. Note the spaced-armor gun shield and the tubular trails; the left trail has been damaged and is bent. This photo was provided by Steve Zaloga. The photo on the right, above,



shows one of the Tiger tanks from the 1. Kompanie of s. Panzer-Abteilung 501. in Tunisia. Note the spare track links fastened below the muffler shrouds and the hose connections for the Feifel air cleaners. The object between the muffler shrouds is a bucket; the vehicle jack is carried on the right just below the air cleaners on that side. Photo from the Steuard collection.

# MARKING BRITISH VEHICLES: A GUIDE FOR SERIOUS MODELERS... PART 2.

## BRITISH & CANADIAN ARTILLERY TRACTORS

( MORRIS, FORD FAT-2, CHEVROLET FAT-4 )

BY WILLIAM PLATZ

On the surface it would seem that markings for these three British vehicles would be simple. Yet, judging from the decals included in the kits, this is not the case; and a closer look at British artillery markings is definitely in order.

To begin with, the 3 types of tractors listed in the title were all employed principally by Royal Artillery Field Regiments and, to a lesser degree, by the Anti-Tank Regiments equipped with 6 and 17-pounder A/T guns. However, each model was introduced at a different time. First was the British-built Morris which was in service with the Royal Artillery at the outbreak of World War II. It was used in France and North Africa during the early campaigns and continued in service in decreasing numbers until the end of the war.

The Ford FAT-2 (with No. 12 cab) went into production in 1941 and continued into early 1942. Built in Canada, these were used by U.K. units as well in North Africa, Europe, and Asia.

The Chevrolet FAT-4 was introduced in 1942 and did not reach the troops in the field until the Desert War was over. A

few may have seen service in Tunisia but this variation was mainly restricted to Europe and the Far East.

With these limitations in mind, the first step in selecting a set of markings is to decide on an appropriate formation sign. Army Group, Army, Corps, Division and Independent Brigade insignia were all found in artillery tractors at various times and locations during World War II. Those correct for the Northwest Europe Campaign of 1944-45 are given in Table I below. For other campaigns, however, check a general source (such as Ballantine Illustrated History of WW II Series) for a list of divisions involved. From 1940 to 1942 every British or Canadian field force division was equipped with towed 25-pounder field artillery regiments. These units all used 'Quad type' tractors as their prime movers, and thus provide a wide variety of possibilities. After October 1942 a growing number of regiments were converted to self-propelled mountings (either 'Bishop', 'Priest' or 'Sexton') with the result that many tractors were withdrawn from service. Therefore, care must be taken to

TABLE I. - 21st Army Group (N.W. Europe) British & Canadian Units with towed 25-pdr. Guns (1944-45)

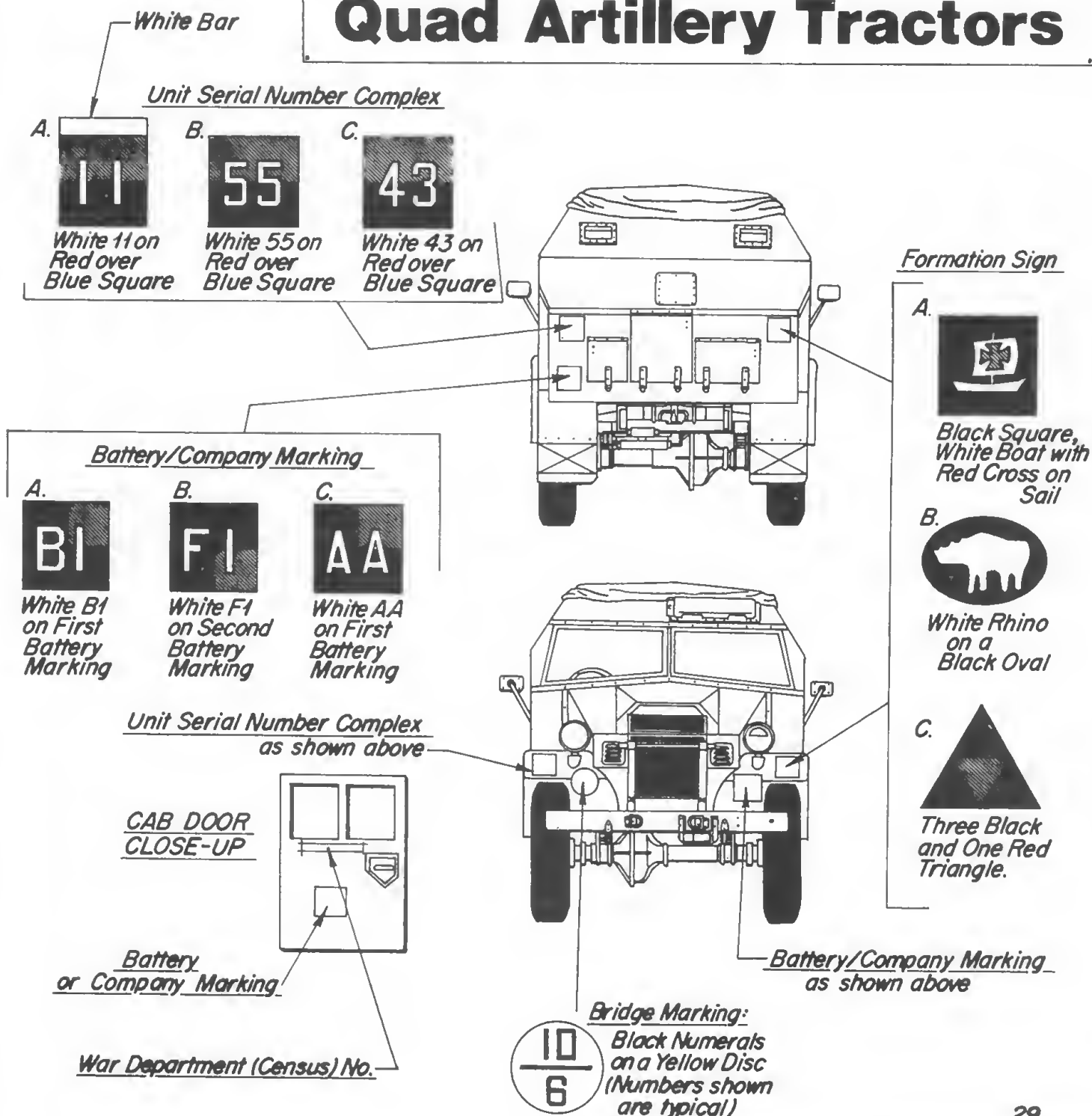
Unit	Formation Sign	Unit Serial	Unit	Formation Sign	Unit Serial
6th Army Field Regiment	2nd Army	174	91st Field Regiment, RA	5th Inf. Div.	42
25th Army Field Regiment	" "	189	92nd Field Regiment, RA	" " "	43
150th Army Field Regiment	" "	182	156th Field Regiment, RA	" " "	44
191st Army Field Regiment	1st Cdn. Army	186	79th Field Regiment, RA	52nd Inf. Div.	42
74th Field Regiment, RA	50th Inf. Div.	42 *	80th Field Regiment, RA	" " "	43
90th Field Regiment, RA	" " "	43 *	186th Field Regiment, RA	" " "	44
124th Field Regiment, RA	" " "	44 *	153rd Field Regiment, RA	Gds. Arm. Div.	76
131st Field Regiment, RA	15th Inf. Div.	42	3rd Royal Horse Artillery	7th Arm. Div.	74
181st Field Regiment, RA	" " "	43	151st Field Regiment, RA	11th Arm. Div.	76
190th Field Regiment, RA	" " "	44	7th Field Regiment, RA	3rd Inf. Div.	42 *
94th Field Regiment, RA	43rd Inf. Div.	42	33rd Field Regiment, RA	" " "	43 *
112th Field Regiment, RA	" " "	43	76th Field Regiment, RA	" " "	44 *
179th Field Regiment, RA	" " "	44	11th Cdn. Army Field Regt.	1st Cdn. Army	174
69th Field Regiment, RA	49th Inf. Div.	42	19th Cdn. Army Field Regt.	" " "	185 *
143rd Field Regiment, RA	" " "	43	1st Cdn. Field Regt. (R.C.H.A.)	1st Cdn. Inf. D.	42
185th Field Regiment, RA	" " "	44	2nd Cdn. Field Regiment	" " "	43
126th Field Regiment, RA	51st Inf. Div.	42	3rd Cdn. Field Regiment	" " "	44
127th Field Regiment, RA	" " "	43	4th Cdn. Field Regiment	2d Cdn. Inf. Div.	42
128th Field Regiment, RA	" " "	44	5th Cdn. Field Regiment	" " " "	43
81st Field Regiment, RA	53rd Inf. Div.	42	6th Cdn. Field Regiment	" " " "	44
83rd Field Regiment, RA	" " "	43	12th Cdn. Field Regiment	3rd Cdn. Div.	42 *
133rd Field Regiment, RA	" " "	44	13th Cdn. Field Regiment	" " "	43 *
61st Field Regiment, RA	59th Inf. Div.	42	14th Cdn. Field Regiment	" " "	44 *
110th Field Regiment, RA	" " "	43	15th Cdn. Field Regiment	4th Cdn. Arm.	74
116th Field Regiment, RA	" " "	44	17th Cdn. Field Regiment	" " "	76

\* = Units equipped with 105mm S.P. Guns ("Priests") for the D-Day landings. British regiments converted to towed 25-pounders in August 1944, but it is uncertain if Canadian units were converted.

# UNIT IDENTIFICATION TABLE

Letter	Unit Description	Veh. Type	Notes
A	No.1 Gun, B Troop, 'Q' Battery, 93rd Anti-Tank Regiment (A&SH), V. Corps, Tunisia 1943	FAT-2	White Star (no circle) on Roof.
B	No.1 Gun, F Troop, 426th Battery, 107th Royal Horse Artillery Regiment, 22nd Armoured Brigade Group, 1st Armoured Division, June 6, 1942; "The Cauldron"	Morris FAT-2	Overall Yellow
C	No.1 Gun, A Troop, 101st Battery, 33rd Field Regiment, R.A., 3rd Infantry Division, August-September 1944, Normandy Breakout.	FAT-4	Overall Green

## Quad Artillery Tractors



**TABLE II. - British Divisional Artillery Unit Serial Numbers**

Unit Type	Dates	No. of Regts.	Artillery Serials		
Infantry Divisions					
1940, British Exped. Force	9/39 to 7/40	3	?	20	?
1940, Middle East	6/40 to 3/41	3	3	4	5
1941, Middle East	3/41 to 10/41	3	42	43	44
1942, Middle East	10/41 to 5/43	3	88	71	53
1942, United Kingdom	'42 to '45	3	42	43	44
Armoured Divisions					
1940, British Exped. Force	9/39 to 7/40	0			
1940, Middle East	6/40 to 2/41	1	34*		
1941, United Kingdom	10/40 to 5/42	1	76	-	-
1941, Middle East	3/41 to 10/41	1	76	-	-
1942, United Kingdom	5/42 to 11/43	2	74	76	-
1942, Middle East	2/42 to 4/43	3	55	?	77
1944, European Theater	'43 to '45	2	74	76	-

\* = Unconfirmed

insure that the division you select had a towed field regiment attached. (Again this information is given in Table I.)

The next item is the Unit Serial Number complex. This too allows wide variation but the number chosen must be from the set for unit type and time period indicated by the formation sign. Unit serials for specific units are given in Table I, while those for field artillery regiments in general are shown in Table II.

While both the formation signs and unit serial numbers have been covered in the previous part of this series, the third marking on a tractor is not as familiar. This is the Royal Artillery Tactical Sign (or Battery mark). Before describing the insignia, however, it will be necessary to digress a bit into the organization of a field artillery regiment.

Up until 1938, the basic unit of the Royal Artillery was the 6-gun battery. Each was numbered separately and could join with other batteries to form a 'field brigade.' Just prior to World War II, however, the artillery was reorganized into permanent regiments of 2, 3 or 4 batteries each. The new

system was still having growing pains when war broke out and it was not until 1942, that the field formation was set as a regiment of 3 batteries each divided into two troops of 4 guns each.

The Tactical Sign, therefore, indicated the battery, troop and individual function for each vehicle in the regiment. This was accomplished by the use of a blue and red square, generally about 10 inches on a side. Three quarters of this square was blue while the fourth quarter was red. The position of the red corner indicated the battery's identity. Upper right corner designated the senior (lowest numbered) battery in the regiment; lower right corner, the second battery; lower left, the third; and the upper left corner was reserved for a fourth battery when present.

Superimposed on this square was a white code, designating the troop and vehicle. In the case of field gun tractors this code took one of the following forms:

**TABLE III. - Artillery Battery Tactical Sign Coding**

Battery	Troop	Gun Number	1st Pattern	2nd Pattern	3rd Pattern
Senior Battery in Regt.	A Troop	No. 1	A	A1	AA
		No. 2	B	A2	AB
		No. 3	C	A3	AC
		No. 4	D	A4	AD
	B Troop	No. 1	E	B1	BA
		No. 2	F	B2	BB
		No. 3	G	B3	BC
		No. 4	H	B4	BD
Second Battery	C Troop	No. 1	A	C1	CA
		No. 2	B	C2	CB
		No. 3	C	C3	CC
		No. 4	D	C4	CD
	D Troop	No. 1	E	D1	DA
		No. 2	F	D2	DB
		No. 3	G	D3	DC
		No. 4	H	D4	DD
Junior Battery in Regt.	E Troop	No. 1	A	E1	EA
		No. 2	B	E2	EB
		No. 3	C	E3	EC
		No. 4	D	E4	ED
	F Troop	No. 1	E	F1	FA

		No.2 No.3 No.4	F G H	F2 F3 F4	FB FC FD
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Of these the most common was the 2nd pattern although all were in use in Northwest Europe. (For example: 3rd Royal Horse Artillery used the 1st Pattern, 83rd Field Regiment R.A. used the second, and the 33rd Field Regiment, R.A. (equipped with 'Priest S.P. 105mm guns) displayed the 3rd pattern.

The remaining markings found on field gun tractors were the War Department Census Number and the bridge marking. The former was a seven-digit number, prefixed with the letter 'H'. (No other prefix was ever used on tractors.) The latter marking consisted of a yellow circle with a black numeral. The number in use, however, varied with either 'S', '9', '9/5' or '6/10' appearing on the yellow circle.

The three field gun tractor kits available all suffer from inaccurate markings on their decal sheet. The first of these, Airfix's 1/76th Morris CS 8 Quad has a completely useless decal sheet. Fortunately, however, 'Micro Scale' has a 1/76 decal set (No. 72-17) with a good selection of British formation signs; and Almark's decal sheet T-IS (Arms-of-Service signs) gives a correct background for the unit serial complex. An appropriate number can be scrounged from the Micro Scale sheet, and a little work can turn the Arm-of-Service flash into a battery mark with only one red corner. Bridging circles (without numbers) are also included in the Almark T-IS sheet and thus the Airfix kit can be adapted to fit virtually any set of markings.

The second kit is Tamiya's 1/35th Fort FAT-2 and the markings here are only a little better. Tamiya provides three different sets of markings in the kit and only one of them is reasonably accurate. The vehicle color should be dark green (not yellow) but the rest of the markings are valid for the Number 1 gun, A Troop, 1st Battery, 2nd Field Regiment, Royal Canadian Artillery, 1st Canadian Infantry Division in Europe 1944-45.

The British Army Marking however is a complete shambles. The first example (with the 'B1' Brigade mark) does not have a single correct insignia and is beyond salvage. The 2nd example (A2) is also inaccurate and self-contradictory however, this can be saved with a bit of work. First trim the 'X' battery mark from the top of the '74' unit serial complex. Next cut the 'A-2' from the bottom of the formation sign and fit the 'red rat' just above the '74' on the right fender leaving a narrow white band around the red rectangle. The battery mark goes on the 'pass' plate on the front of the vehicle. This must either be hand-painted or scrounged from the Peerless kit since Tamiya gives you the wrong code letters. (The 'X' code indicates the battery commander's vehicle which in this unit would be either a Cromwell tank or an A.O.P. Carrier, not a tractor). Pick a single code letter from Pattern No. 1 above and apply it to the battery mark. One final touch: trim the 'C' from the Canadian Serial number and use 'H-4216530' for the census number. The result is a gun from 'D', 'J', or 'M' battery, 3rd Royal Horse Artillery Regiment, 7th Armoured Division, July 1944.

The third kit is the Peerless 1/35 Chevrolet FAT-4 and has the most useful decal sheet of the three. Peerless also gives three alternate sets of insignia, all of which are usable — with only minor alterations. The first two examples need a new formation sign to make them accurate. Of the two formation signs on the sheet, one (the red, white and blue) bears no resemblance to any Canadian insignia of World War II, the second is for the 4th Canadian Armoured Division and does not fit the two infantry unit serials. The easiest solution would be to lift the 1st Canadian Division insignia from the Tamiya kit; however, I would recommend painting a 'French Grey' rectangle and adding a maple leaf from the decal sheet to give the insignia of the 3rd Canadian Infantry Division. With this insignia the given markings would denote No.4 gun, D Troop, 16th Field Battery, 12th Canadian Field Regiment, or No.2 gun, D Troop, 44th Field Battery, 13th Canadian Field Regiment. Both units were from the 3rd Division during 1943 while it was stationed in the United Kingdom. (The towed 25-pounders were replaced by Sexton S.P. guns prior to D-Day). The only other modification needed is to put the 'C' in front of the census

number of the first example. The third set of markings is correct as given but needs a code letter on the battery mark.

The illustrations which accompany this article gave three other sets of markings for Quad Tractors in a variety of usages.

#### The German Armored Reconnaissance Battalion Headquarters (Continued from Page 32)

to forward reconnaissance units, and discovered intelligence could be sent to higher headquarters rapidly, enabling quick reactions to discovered enemy threats.

The remaining Headquarters elements consisted of a small Battalion Trains Section and a Maintenance Section. The Battalion Trains Section consisted of three vehicles; one light car carrying the Section Leader and Battalion Clerk, one 3-ton truck carrying the Headquarters Mess Team, and one 3-ton truck carrying the Headquarters reserve fuel. This latter vehicle could be dispatched to bring forward additional supplies, either provisions or fuel, as required.

The Maintenance Section consisted of three vehicles and was organized around one *Sd. Kfz. 7* halftrack which served as a recovery vehicle. In case of need, this halftrack had sufficient drawbar pull to provide recovery for any of the Battalion's assigned vehicles, from light armored cars (*Sd. Kfz. 222*) to medium armored halftracks. The other two vehicles in this section consisted of 3-ton trucks, one provided to carry tools and personnel, and the other to carry spare parts. Although this section was quite small in terms of manpower, it had an awesome responsibility in keeping the Headquarters vehicles running and well-maintained.

As can be seen, the Headquarters of the German Armored Reconnaissance Battalion was a very flexible organization created to specifically provide command and communications support for the divisional reconnaissance efforts. Although smaller than a Company in size, the Headquarters was quite effective in performing its missions during the 1943 period. Later, when reconnaissance missions became defensive in nature (and much more complex), the Battalion Headquarters was modified in structure and role, becoming a company-sized unit with additional sections and manpower. As such, it will be the subject of a future article in this series.

#### Model Reviews (Continued from page 22)

faults, there are almost none! Provisions are made for the installation of two Nitek blackout lights, one on each front fender. Of course, only one should be fitted on the right fender; the other hole should be filled-in with Green Stuff. The rear license plate needs filing-down to a thinner profile, but this is easily done. Small pieces of clear acetate may be cut and installed in the windshield areas, as the kit's open spaces are more than I can stand. Other than these brief faults, the kit is superb in all aspects.

If you're into small scale modeling, this is one kit that I can recommend. It accurately depicts a 'standard' German military vehicle; the few faults can be lived with, and the conversion possibilities are enormous.

#### Small War's Cast Metal Scale Military Miniature Vehicles in 1:450 Scale...

Reviewed by James Steuard

The miniature vehicles which are the subjects of this review were introduced to the reviewer at the First International Militaria Exposition, held recently in San Diego, California. These vehicles were created in the small scale of 1:450 in order to be used in conjunction with standard board wargaming hex grid sheets. Each of the small vehicles will fit inside of a S/8-inch hex, and may be used to represent single

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# THE GERMAN ARMORED RECONNAISSANCE BATTALION HEADQUARTERS

The German Armored Reconnaissance Battalion was a very complex and involved organization, featuring widely different types of reconnaissance units designed for largely independent operations. As the organization evolved in many directions during the 1942 through 1945 time period, the command and control apparatus also evolved in order to provide effective command and support functions. This article is designed to illustrate early evolutions of the headquarters of the *Panzer-Aufklärungs-Abteilung* [gepanzert]: the Armored Reconnaissance Battalion of the typical German *Panzer-Division*.

During the 1943 time period, German Armored Reconnaissance Companies were attached to other elements of the *Panzer-Division* for operations; it was relatively uncommon for elements of the Battalion to operate together (except for non-tactical moves, bivouacs, etc.). In parallel with this type or concept of operations, the Headquarters (or *Stab*) of the Armored Reconnaissance Battalion was designed for support and control of this type of combat operations. As could be expected, the largest problem in control of wide-spread, often independent operating companies, was communications. Since reconnaissance information is generally useless unless rapidly communicated to the higher command elements of a division, communications at the Battalion-level was of prime importance during 1943, when the *Panzer-Divisions* were still being used in an offensive role. Accordingly, the main function of the Headquarters was 'communications' support. The secondary element of the Headquarters was the 'command' section which existed for planning and coordination of the divisional reconnaissance efforts; in short, the command group put together reconnaissance operations, regulated the operations of the attached reconnaissance elements of the battalion, and provided decisions (when required) to accomplish the type of reconnaissance required by higher headquarters. This latter mission was often required since commanders of *Panzer-Grenadier* or *Panzer-Regiments* were quite often ignorant of reconnaissance requirements of the division and utilized their attached reconnaissance companies totally in support of regimental operations.

The *Stab* (or Headquarters) of the German *Panzer-Aufklärungs-Abteilung* [gepanzert] was organized under *Kriegsstärknachweisung* (or *KStN* 1109[gp]). The chart on the following pages illustrates the 1943-period organization. Note that this unit was not designated as a Company (*Kompanie* in German); it was instead a smaller unit simply designated as a 'Stab'. (In 1944, the unit actually became a 'Kompanie', as it was then totally self-sufficient.) The 'Stab' consisted of 5 officers, 23 non-commissioned officers, and 66 enlisted men, organized into the following sections:

- Command Group
- Signal Platoon
- Battalion Trains Section
- Maintenance Section

In terms of weaponry, the *Stab* was equipped with 22 pistols, 3 machine-pistols (or sub-machine guns) and 45 rifles. In addition, each of the armored vehicles in the unit was provided with an additional machine pistol as 'on-board' weaponry.

The Command Group of the Headquarters provided command and control of the battalion's assigned companies, which were generally widely dispersed throughout the divisional zone of operations. To accomplish these functions, the Command Group was sub-divided into three elements; a three-vehicle Staff, a Messenger Section and a one-vehicle Medical Section. The Staff element consisted of a light car (usually a Volkswagen *Kubelwagen*) for the Adjutant and his Clerk, a light armored halftrack communications vehicle (*Sd. Kfz. 250/3*) for the Operations and Planning staff, and a medium armored halftrack communications vehicle (*Sd. Kfz. 251/3*) for the Commander. The two communications halftracks were each equipped with medium-power radio sets which could enter the division command radio net as well as provide control

over the Battalion's command radio net.

The Messenger Section consisted of a control element in a light car, and six motorcycle mounted messengers. Three of the six messengers were provided with *Sd. Kfz. 2 Kettenkrad* tracked motorcycles for use over rough or impassable terrain, while the other three messengers rode 350cc solo motorcycles.

The Battalion's Medical Section consisted of one *Sd. Kfz. 251/8* armored ambulance; the vehicle's three-man crew was under the command of a commissioned Medical Officer.

The Battalion Signal Platoon was the largest element of the Headquarters, consisting of a small Platoon Headquarters and eight Communications Squads; two 'Wire', one 'Aircraft Radio' and five Medium Wave Radio. This Platoon formed the principal long distance communications unit of the entire Battalion, and in use, the various Squads were often apportioned out to the assigned Companies to assist in their long-range communications requirements. The Signal Platoon Headquarters consisted of one light car, carrying the Platoon Leader, Platoon Sergeant and Radio Repairman, and one armored halftrack communications vehicle. This halftrack provided back-up communications for the Battalion Staff, and gave extra radiomen to the Staff for communications monitoring purposes.

The various Communications Squads in the Signal Platoon were independent units, each formed around a specific piece of equipment as an interchangeable module. Two of these squads were identical 'Wire' units, each organized around on *Sd. Kfz. 251/11* armored halftrack wirelaying vehicle. Each 'Wire' Squad carried a switchboard and field telephones, as well as ten kilometers of wire which could be vehicular-laid in support of a Battalion wire net. In static situations, these two squads ran the telephone net of the Battalion, providing linemen, switchboard and telephone operators as required.

The Signal Platoon was also assigned a Light Aircraft Radio Squad, organized around a light armored halftrack (*Sd. Kfz. 250/3*), and equipped with 20-watt ultra high frequency aircraft communications radios. This unit was responsible for netting with the Luftwaffe's close-support reconnaissance aircraft which operated in or near the divisional sector of operations. By providing a direct link with these aircraft, the Headquarters could monitor intelligence happenings as discovered by the aircraft and thus have a capability of rapid response to discovered threats. This Radio Squad normally operated in close conjunction to the Platoon Headquarters armored halftrack, which could serve to relay intelligence findings direct to the Division Headquarters as required. It should be stressed that this Squad did not have the capability of directly entering either the divisional or battalion communications net; the Squad's radios operated only on the aircraft ultra high frequency band, and a relay vehicle was necessary to pass on discovered information.

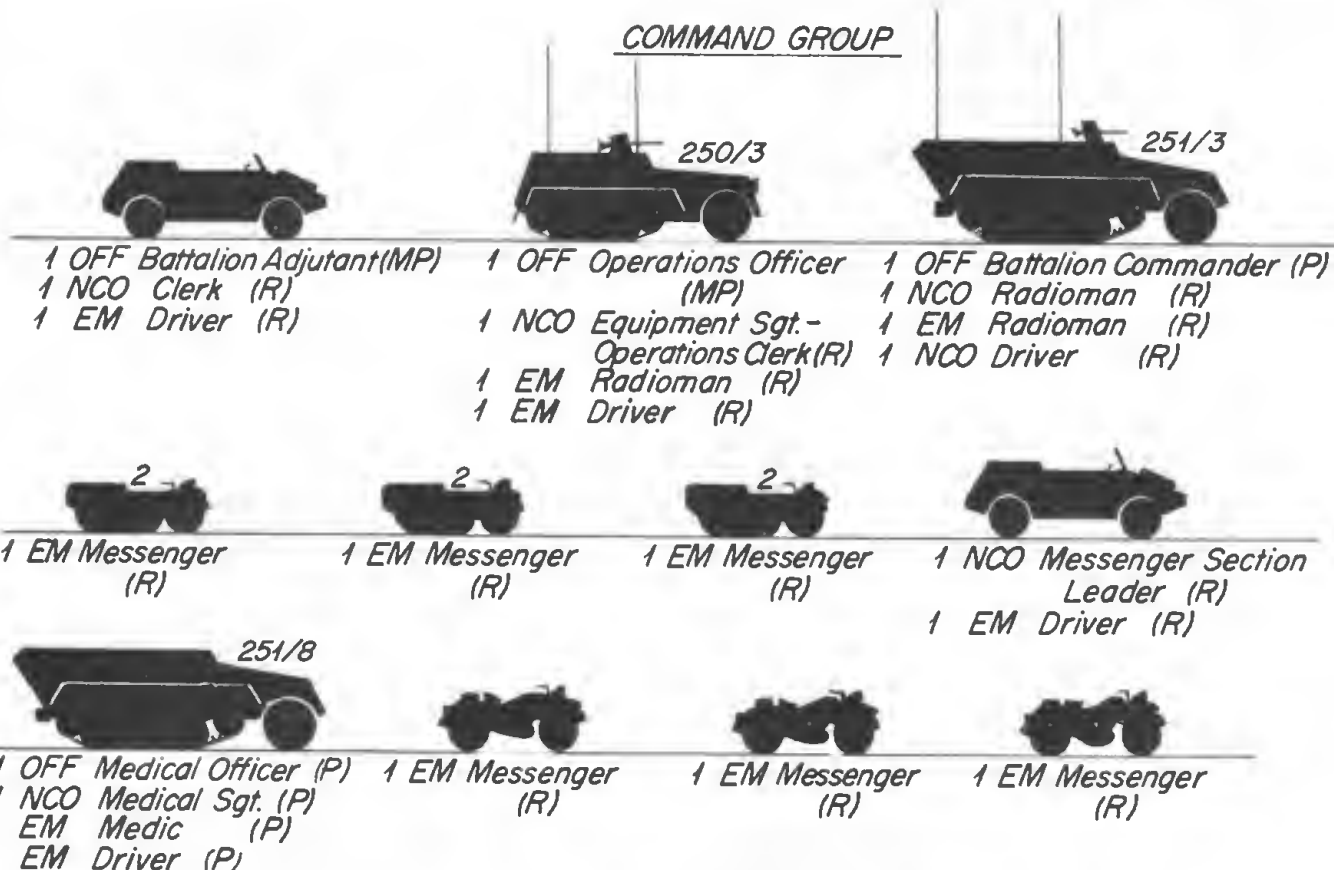
The remaining five Radio Squads in the Signal Platoon were identically-organized Medium Radio Squads, each equipped with one *Sd. Kfz. 251/3* armored communications halftrack, and communicating via one 80-watt medium wave radio transmitter and receiver. This radio set had long-range capabilities in both voice and morse code (or CW); however, code was used more often as it offered greater strength over the longer ranges. Normally, one of the five Medium Radio Squads remained with the Battalion Headquarters, while the remaining four Squads were each attached to one of the Battalion's reconnaissance units operating at some distance from the parent Headquarters. In this way, each of the Companies could link directly to the Headquarters to pass along intelligence they had gathered. This form of attachment was flexible in that Companies which were operating close to the Headquarters did not require the attached Squads, which were then retained under Battalion control. This flexibility of operations was one of the primary reasons why German reconnaissance was so effective; long-range communications were instantly available

Continued on Page 31

# STAB EINER PANZER-AUFKLÄRUNGS-ABTEILUNG (GEPANZERT)

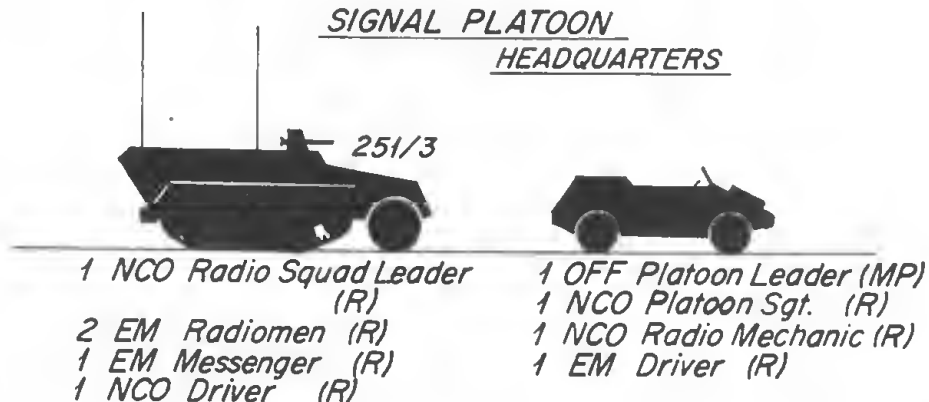
KStN 1109(gp.) dated 1 November 1943

## COMMAND GROUP



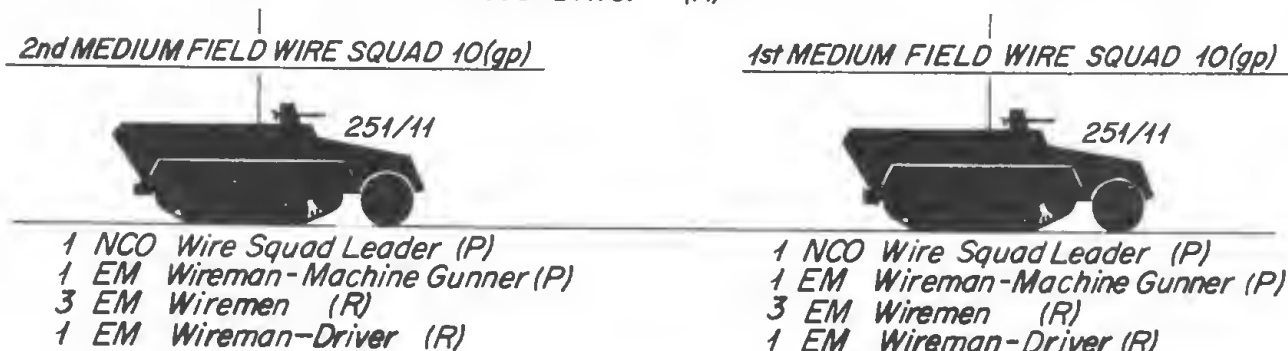
## SIGNAL PLATOON

### HEADQUARTERS



### 2nd MEDIUM FIELD WIRE SQUAD 10(gp)

### 1st MEDIUM FIELD WIRE SQUAD 10(gp)



- Continued on next page -

FIRST MEDIUM RADIO SQUAD  
80 Mw (gp)



1 NCO Radio Squad Leader (P)  
4 EM Radio Operators (R)  
1 EM Radio Operator-Driver (P)

LIGHT AIRCRAFT RADIO SQUAD  
20 Ukw (gp)



1 NCO Radio Squad Leader (R)  
2 EM Radio Operators (R)  
1 EM Radio Operator (P)

SECOND, THIRD, FOURTH and FIFTH MEDIUM RADIO SQUADS are identical to the FIRST MEDIUM RADIO SQUAD 80Mw(gp) above left.

BATTALION TRAINS SECTION



1 EM Clerk (R)  
1 EM Driver (R)



1 NCO Mess Sergeant (R)  
1 EM Cook (R)  
1 EM Driver (R)



1 NCO Section Leader (P)  
1 NCO Battalion Clerk (P)  
1 EM Driver (R)

MAINTENANCE SECTION



2 EM Mechanics (R)  
1 EM Mechanic-Driver (R)



1 NCO Supply Sergeant (P)  
1 EM Driver (R)



1 NCO Chief Mechanic (R)  
1 EM Mechanic (R)  
1 EM Driver (R)

This article on a German armored reconnaissance unit is a part of a continuing series on the subject of these units. For an overall look at German reconnaissance units, readers are referred to an article on these units appearing in AFV-G2, Volume 4, Number 3. Other parts of this series include: The German Motorcycle Reconnaissance Company (Vol. 4, No.5),

The German Armored-Car Reconnaissance Company (Vol. 4, No. 7), The German Puma Armored-car Company (Vol. 4, No. 11), The German Full-Track Reconnaissance Company (Vol. 5, No.1), and The German Volkswagen Reconnaissance Company (Vol. 5, No. 3). As always, readers are encouraged to comment and request future articles in this series...



Book Review: *Truppendienst Taschenbuch: Die Armeen der neutralen und blockfreien Staaten Europas* (Service Pocketbook: The Armies of Neutral and Non-aligned European Nations);

*Taschenbuch der Landstreitkräfte:*

*Band 1 Die Armeen der NATO Staaten, Band 2 Die Armeen der Warschauer Pakt-Staaten* (Pocketbook of the National Armed Forces: Book 1 Armies of the NATO Nations, Book 2 Armies of the Warsaw Pact Nations)

(Publisher: J.F. Lehmanns Verlag, 8 München 21, Agnes-Bernauer-Platz 8, Postfach 210 140)

Reviewed by Mark Diehl

For most people the use of foreign language reference works conjures images of translation/transcription difficulty. Such difficulties for these three references are minimal since a wealth of information may be derived by one totally unfamiliar with the German language, with the assistance of a small German-English dictionary. For those of us having a more sound background in German, these references are invaluable.

The author of these handbooks is Dr. Friedrich Wiener, a Major in the Austrian Army. Each title is well organized along parallel lines. A general introduction and table of abbreviations is followed by studies of individual nations. For the study on the neutral nations each country is discussed individually through a strategic summary, organizations background, order of battle and deployment information, and an equipment survey. For the NATO and Warsaw Pact handbooks a history of the alliances, their military and civil organizations is followed by strategic surveys of the member nations. Organizations, deployments and orders of battle are presented in as detailed a manner as a general survey and security restrictions permit. Air, sea and land forces receive equal attention in these discussions. Elementary strategic and tactical concepts are presented, followed by one of the most detailed contemporary weapons summaries found.

It is in Dr. Wiener's presentations of weapons where, perhaps, the greatest value to readers will be found. Weapons and equipment are presented in a unified manner: infantry weapons, artillery, air defense weapons, armor, transport vehicles, engineer equipment, and aircraft. This content has approximately one third illustrations, both photo and line drawing, one third tabled data and one third descriptive text. Concise weapon capability in terms such as combat range, rate of fire and armor penetration is presented for the variety of currently available infantry antitank weapons, wire guided missiles and artillery weapons. Armored vehicles are thoroughly surveyed, often indicating which units are equipped with which vehicles. As a bonus, frontal and side drawings are found for practically every armored vehicle. The emphasis of Dr. Wiener's presentation on engineer equipment falls upon bridging and crossing equipment, and is very thoroughly presented. His aircraft studies present major types and variants

usually with a photo, tabled data and front-side-bottom view line illustrations.

The small size of these books (approx. 6¼ by 4½ inches) is no drawback. Their compactness makes them ideal for use on the modeler's and wargamer's table, as well as a prime reference for those having a premium of space. Ounce for ounce these are the best references of this type to be found.

*The Armies of Neutral and Non-aligned European Nations*, published 1972, has ISBN 3-469-00422-6, consists of 292 pages, and costs DM 24.

*Armies of the NATO Nations*, published 1974, has ISBN 3-469-00486-2, has 576 pages, 347 photographs, and 438 line drawings, and costs DM 44.

*Armies of the Warsaw Pact Nations*, published 1975, has ISBN 3-469-00523-0, 416 pages, 337 photographs, and 302 line drawings, and costs DM 44.

Although somewhat costly, these books are well worth the investment. Their data and information is, on the whole, precise and accurate. Their uses should be widespread. If there is one set of references that I wish I received sooner, it is this trio on contemporary military affairs in Europe. Anyone wishing to purchase these books should either contact their local foreign book importer or send an international money order or bank draft in German currency and obtainable through a local bank, to J.F. Lehmanns Verlag.

Book Review: *Sturmgeschütz III. in Action*, by Bruce Culver (Squadron/Signal Publications, 3461 E. Ten Mile Road, Warren, MI 48091, \$3.95)

Reviewed by James Steuard

The latest in Squadron/Signal's continuing series on armored vehicles (numbered '14'), *Sturmgeschütz III. in Action* is a logical extension of the coverage of German vehicles started by this company some years ago. As the title suggests, this book covers the assault gun which was based on the *Panzer III* chassis. The book contains 50 pages and has 102 photographs and 11 excellent color illustrations by Don Greer.

The book contains a few faults, not the least of which is the fact that most of the photos have appeared elsewhere. Since Squadron/Signal has published two other books which deal with the identical subject matter, quite a few of the pictures have appeared in these books. Thus, if you have the rest of the books in the armor series, you'll find some redundancy in this new publication. The book also shows evidence of being put together in some haste, as there apparently was some problem in checking out the picture captions prior to publication. For example, two excellent (and new) pictures of *Sturmgeschütz III*'s are shown on page 28, identified as vehicles in Italy. The unfortunate thing is that the unit (*Fallschirm-Panzer-Division 'Hermann Göring'*) is not identified in either caption. Don Greer has excellently captured the upper vehicle in one of his colored profiles (on the centerspread), but the caption identifies the vehicle as being in France during 1944 instead of Italy in 1943. This kind of thing obviously detracts from the book's

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**American Armored Units:**

# **THE 781ST TANK BATTALION IN COMBAT**

**by John G. Yonos**

The 781st Tank Battalion was activated on January 2, 1943 at Fort Knox, Kentucky. Many of the enlisted men and some of the officers had seen action with other armored units, however, most of the Second Lieutenants came to the new battalion directly from OCS. At Fort Knox, the tankers of the 781st road tested vehicles and tanks for the Armored Force Board. One of the most important evaluation tests conducted on the M4 Sherman medium tank was done with the aid of men from the battalion. Forty tanks were used, one group of ten M4's with radial aircraft-type engines, one group of ten M4A2's with diesel engines, one group of ten M4A3's with Ford V8 engines, and one group of ten M4A4's with five Chrysler automobile engines joined as a single power plant. Testing was done in order to pick a 'standard' tank from these four types, and it was concluded that the Ford engine was superior to the others.

After thorough training at Camp Shelby and Camp Jackson, the 781st was judged combat ready. On Friday the 13th of October, 1944, the officers and men of the battalion boarded the USS La Juenne for transport to Europe. On a windy, muddy hill outside Marseille, France, the 781st bivouaced for the first time in Europe. During off-loading, it was discovered that a thousand boxes of the battalion's stores were lost in transit, and it became necessary for the battalion to be re-supplied. A good many days of muddy bivouac followed, and a month later, the battalion set out for the front lines in Alsace.

On their arrival in the combat zone of action, the battalion was attached to the 100th Infantry Division (nicknamed the 'Century' Division). 'A' Company of the 781st was attached to the 399th Infantry Regiment; 'B' Company to the 398th Infantry



Regiment; and 'C' Company to the 397th Infantry Regiment. 'D' Company, the battalion's light tank company, was divided with a platoon going to each of the three regiments.

The first combat action seen by the 781st Tank Battalion took place around Bitchie, one of the major fortress positions of the former Maginot Line. The Germans were using many of the forts as defensive positions to keep the Americans out of Germany. At Lembeck, a small town about 4 miles south of Bitchie, the first platoon of 'A' Company, under the command of Lieutenant William Kaiser, supported elements of the 399th Infantry in its attack. The tankers were aggressive in the support, and the platoon was credited with extraordinary aid in the assault. Lt. Kaiser was awarded the Silver Star medal, and many of his tankers received Bronze Star medals. Two days later, the second platoon, under the command of Lt. Donald Crane, attacked northward toward Bitchie. Lt. Crane received the Silver Star for his aggressive leadership in this attack, during which the platoon knocked out three Flak halftracks, two 75mm infantry howitzers and two heavier howitzers. Within a period of four days, the entire battalion saw action in the vicinity of Mouterhouse.

After taking several of the Maginot Line forts around Bitchie, it was decided to use a bulldozer tank from the battalion headquarters to pile dirt and rubble around the forts in order to prevent their use in any subsequent German counterattack. The dozer tank piled so much dirt around the forts that the tank became trapped in the hole it had dug. While the crew was attempting to extricate the tank, direct fire from an enemy 88mm gun forced them to abandon the vehicle. In March of 1945 when the town of Bitchie was finally taken, many of the German Pioneer troops in the area mentioned that several of the forts had been impossible to dig out. For their actions in covering these forts, the Headquarters Company was awarded the Presidential Unit Citation.

In December of 1944, the German counterattack through the Ardennes disrupted the American attacks into Germany. American forces were sent to relieve enemy pressure on Bastogne, Belgium, and the 781st was detached from the 100th Infantry Division to help in the relief attempt. During the next month, the 781st supported five different divisions, including the 101st Airborne Division. On December 23rd, with the support of the 79th Infantry Division, two platoons of 'C' Company actually bivouaced on German soil; however, their stay was short.

A fierce battle took place near the town of Wingen, where a German *Waffen-SS* regiment had established a position behind American front lines. This German unit had infiltrated through the American lines and was actually some four miles in the rear of the front lines. On the 4th of January, 1945, the Germans attacked and captured the Command Post of the 276th Infantry Regiment (of the 70th Infantry Division). On the next day, the tankers of the third platoon, 'B' Company, 781st Tank Battalion, were ordered to support the 1st Battalion, 276th Infantry, in an attempt to take Wingen. Since a number of Americans were suspected to be hiding in the outskirts of the town, the tankers were ordered not to fire their main guns unless they were absolutely sure of their targets. As the advance moved toward the town, Germans knocked-out the two leading tanks with *Panzerfausts*, blocking the only road. The attack bogged down without the necessary armor support and the infantry battalion was forced to withdraw. The next day, the attack was renewed, with the tanks now being given complete freedom to engage any target with their main weapons. By the 6th, the town was captured but the tanks were withdrawn to prevent possible destruction at night by roving *Panzerfaust* tank hunter teams. As the tanks were being withdrawn, the Germans launched a counterattack, taking part of the town. On the 7th, with heavy armor support, the Germans were pushed out for good.

While the battle for Wingen was occupying 'B' Company, 'A' Company was making a lightning raid on Gambenheim. They took some 60 prisoners and liberated 11 Americans who had been captured earlier. Ten days later, a German attack isolated Sessenheim, trapping most of an American infantry company inside the town. The second platoon of the 781st's 'A' Company, acting together with the 79th Infantry Division



Photo, Above: A tank crew from the 781st Tank Battalion poses in front of their 76mm gunned M4A3. Note the wire baskets on the turret sides to hold sandbags. Photo Credit: U.S. Army

Reconnaissance Troop, moved quickly to relieve the elements of 'B' Company of the 232nd Infantry Regiment inside of Sessenheim. They succeeded in relieving the infantry and captured the town of Statmmatten, a short distance beyond Sessenheim. However, on the next day the Germans counter-attacked and pushed the armoured force out of both towns.

The following morning at 0600 hours, the tanks of 'A' Company warmed-up for another attack on Sessenheim. Shortly before 0700, the unit arrived at the line-of-departure and moved out, accompanied by infantry. About 400 yards before the town, tankers noticed a large white lump sitting off to one



Photo, Above: An M4A3 Sherman of the 781st Tank Battalion moves through a forest near Bitchie, France. Note the sandbag rack on the frontal armor. Photo Credit: U.S. Army

Photo, Opposite Page: The end of a long road. Tanks of the 781st Tank Battalion move into a village near the strategic Brenner Pass, as German surrender. Photo Credit: U.S. Army



*Photo Above: One of the 781st Tank Battalion's M4A3's, shown entering a stream near Garmisch, Germany. Note the Allied recognition stars.*

*Photo Credit: U.S. Army*

side of the road. Suddenly, the lump spoke up with its 88mm gun. During the previous night, the Germans had moved up four of the formidable Tiger tanks. Against these monsters, the Sherman's 75mm gun had little effect, since the German tanks were siting to provide mutual flank protection. A Tiger tank fired at the M4A3 Sherman commanded by a Sergeant Johnson. One projectile landed to the right of the American vehicle; one landed to the left. While the Sherman was attempting to back-up, the third shell left a trail of sparks as it traveled along the belly of the Sherman, doing a great deal of damage to the paint job (and the nerves of the tankers). Eight American tanks were hit by the various German guns; six were left smoldering on the battlefield.

It is unusual for a tank battalion's 'D' Company, equipped with M5 Light Tanks, to see much combat as the light tanks were useless against German armor or anti-tank guns. However, 'D' Company of the 781st were ordered to proceed to an infantry bivouac area to link up with an attacking force. While traveling up a road to the bivouac area, the light tanks passed a group of infantry in white camouflage suits, digging in on both sides of the road. Lieutenant Shartel, the platoon leader



*Photo Above: One of the 781st's opponents, a shot-out German Panther. The Shermans found it tough combatting a Panther.*

*Photo Credit: U.S. Army*

of 'D' Company's second platoon, found no infantry in the bivouac area when he arrived there. After they had returned to their starting point to receive better directions, they were informed that there was no American unit equipped with white camouflage suits! They again went up the road, this time accompanied by a company of infantry, and killed over 300 Germans without a single loss. After failing to find the attached infantry, the first platoon of 'D' Company was reinforced by cooks, clerks and anyone who could be found available, and the platoon with its attached 'infantry' was sent in an effort to retake Stattmatten, which had been re-captured by the Germans on January 5th. Realizing that stealth might make a difference, the light tank platoon moved up quietly. They succeeded so well that they surprised the German battalion commander and his staff before they could evacuate the town.

When the German's Ardennes offensive finally came to an end, the 781st Tank Battalion was still being used as a 'fire brigade' in the Alsace area. Small task forces were organized for raids against German-held towns and positions in an effort to make the Germans think more armor was in the sector than was actually there. These task forces usually consisted of a platoon, or at the most two platoons of armor, and up to a battalion of infantry. By mid-January, the German gains of December had been retaken by the Allies. The last German reserves had been committed, and now both sides took time to lick their wounds.

At 0100 hours on 14 March, over a thousand guns opened up on the Germans in front of the US Seventh Army. By dawn, the attack on Germany itself had commenced. The 781st Tank Battalion was back with the 100th Infantry Division, as it attacked once again toward Bitchie. In two days, the town which had been the initial objective of the 781st had been captured. The townspeople told the Americans that the town had been occupied by only a handful of Germans on the eve of the von Rundstedt offensive. In reality, the town could have been taken more easily three months earlier!

In the next few days, the 3rd Infantry Division broke through the Siegfried Line at Zweibrucken (Duex Pons in French), and opened the way for the 781st and the 'Century' Division to penetrate into Germany. Zweibrucken had been hard to take for the 3rd Division, and the majority of the town through which the 781st passed was a pile of rubble. The way ahead was lightly defended, however, and the tankers and infantry encountered only light opposition. When they stopped for the night, they were 110 miles inside Germany.

Upon reaching the Rhine River on March 22, the 100th Infantry Division and attached 781st Tank Battalion halted on the west bank to rest and re-equip before making the plunge deeper into enemy territory. On March 31st, the tankers crossed the Rhine at Mannenheim. As they approached Heilbronn, the Germans opened up on the infantry as they were crossing the Neckar River. As the Germans were using pre-registered artillery fire, casualties were heavy. Tanks of the 781st's Headquarters Company had been recently equipped with the T34 Rocket Launcher, nicknamed the 'Calliope'. This device consisted of a 60-unit 4.6-inch rocket launcher, with the rocket tubes mounted in four rows above the turret of the tank. The entire unit was elevated by a bar attached to the tank's main gun tube; by elevating the gun, the rocket launcher could also be elevated. All 60 tubes could be fired from inside the vehicle. The 781st 'Calliope's' moved to high ground across the Neckar River and began firing on targets inside Heilbronn with their rockets. In the meantime, the first and third platoons of 'A' Company had been modified by attaching collapsible rubber screens to the sides to make them amphibious. Using these screens, the tanks swam the river. The eastern bank was too steep for the tanks to climb, however, and three tanks were lost in the river.

The 103rd Infantry Division was now racing through Southern Germany toward Austria. On April 24th, a small force of the 103rd Reconnaissance Troop discovered a large force of German soldiers in Munsingen, a large town which had been a German military training center. The observed Germans were riding around the town as if on holiday. They reported this information to Company 'B' of the 410th Infantry Regiment.

Continued on Page 44

# My Kind of L3

by Ted Felt

AT last! An L3 that can take on the 11th Hussars! An L3 armed with a 20 millimeter 'boom-boom'.

More specifically of course, an Italian L3/35 tankette which was outfitted with a 20mm Solothurn anti-tank rifle. Of the bibliographic sources listed below covering this particular L3 variant, the one most helpful was by D. J. Bremner in **TANKETTE Magazine**. All of these references do seem to imply that '20mm' L3's were only used in the Western Desert Campaign. As the L3 was the 'main battle tank' of the Italian 'LITTORIO' Armored Division during that Division's hey-day in the Yugoslavian Campaign, one would hope some of their 'MBTs' were so up-gunned. For that matter, the L3's used in Russia would have been much more viable fighting machines if they had their dual 8mm machine guns replaced by 20mm Solothurns. This of course, is pure speculation on my part.

Some rough spec's on the capability of the Solothurn should include that it is semi-automatic only (sear 'polishers' might be able to fix that), and uses both five and ten round magazines. Possibly, due to confining space, and to get good traverse, the 5-round magazine may have been the one most likely used in an L3. Armor-piercing performance is 15-18 millimeters (30 degree slope) at 300 yards, or in practical terms, you can knock out a Marmon-Herrington Mk III at about 500 yards.

In up-gunning the CREST 1/76 scale L3-35 kit, a FUJIMI 1/76 scale British Infantry set Boys anti-tank rifle barrel was used. This barrel had a 'planned flash' muzzle brake which is a perfect match for a Solothurn muzzle brake. A slightly cut down TAMIYA Pak 35/36 3.7cm spent shell case is used for the breech end of the 'Solothurn' barrel. The weapons unit is then glued to the normal gun mount (sans machine gun barrels) provided in the CREST L3 kit. My L3 is further bulwarked for survival with a layer of FUJIMI sand bags, and a bit of lichen foliage, to camouflage it from all those roaming 'Marmon-Herringtons'.

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## COLOR 'N CAMOUFLAGE:

### Modern U.S. Army 4-Color Camouflage

by Gary Binder

Having received an overall favorable response to last issue's article which contained four-color camouflage patterns for an Army helicopter, we continue pattern coverage of the US Army's OH-58 Kiowa. In Volume 5, Number 11 we will resume coverage of ground vehicles, and will continue coverage in response to reader requests.

The photographs to the immediate left are provided for visual reference purposes. The top photograph shows an M109 Self-propelled 155mm Howitzer of the 2nd Battalion, 34th Artillery, assigned to the 194th Armored Brigade. The picture was taken at Fort Knox, Kentucky in June of 1975. The scheme is the 'Winter — U.S. and Europe — Verdant', with all lettering in black. Note the missing rubber side skirting and the small black star on the frontal hull armor.

The middle photograph shows an M60A1 medium tank, equipped with a bulldozer blade kit. This vehicle is assigned to the 4th Battalion, 63rd Armor, stationed with the 1st Infantry Division at Fort Riley, Kansas in August of 1975. The paint scheme is also the 'Winter — U.S. and Europe — Verdant', with the pattern extended onto the bulldozer blade. Note the unit identification codes painted in black along the upper edge of the bulldozer blade.

The lower photograph, left, shows an M60A2 medium tank of the 1st Battalion, 67th Armor, assigned to the 2nd Armored Division in June of 1975. All of the vehicles in the picture are painted in 'Gray Desert' scheme, consisting of 45% Sand, 45% Field Drab, 5% Earth Yellow, and 5% Black. Reportedly, desert camouflage patterns began appearing on vehicles around the time of the Arab-Israeli War in October of 1973.

It is difficult to convey the appearance of the four-color camouflaged vehicles through the media of text and black-and-white pictures; obviously the vehicles should be observed in the terrain where they are intended to be operated. The overall effect of the new four-color camouflage schemes is excellent. Camouflaged vehicles blend extremely well into the surrounding terrain and the patterns are very effective in breaking up the outlines of the vehicles. It becomes very difficult to observe or identify camouflaged vehicles at ranges over 400 meters when stationary.

The two paint chips below complete coverage of the various colors used in the US Army's four-color camouflage system. These two colors are, of course, used as the 5% ground color, which may be varied within the camouflage system in order to more closely match the terrain in which the vehicles are operating.

The next issue's article will illustrate several of the experimental camouflage schemes which were tested prior to adoption of the standardized four-color system. As is usual, reader comments and photographs are welcome.

#### DESERT SAND 30279

13 pts Floquil M79 Khaki  
4 pts Floquil RR11 Reefer White  
1 pt Floquil M28 Polish Crimson  
1 pt Floquil RR12 Reefer Gray

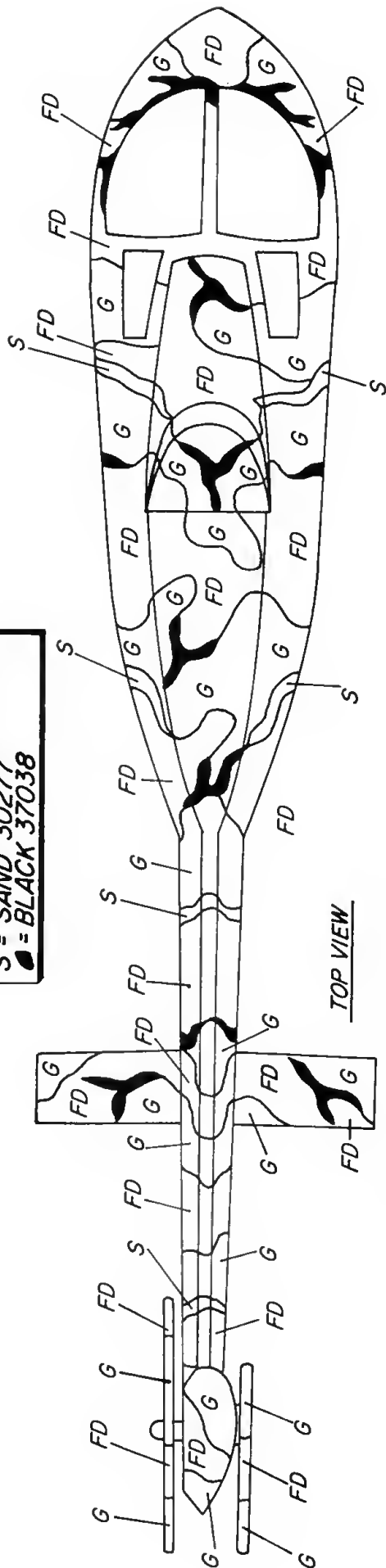


#### OLIVE DRAB 34087

10 pts Floquil M39 Olive Drab  
10 pts Floquil RR45 Pullman Green  
1 pt Floquil RR10 Engine Black

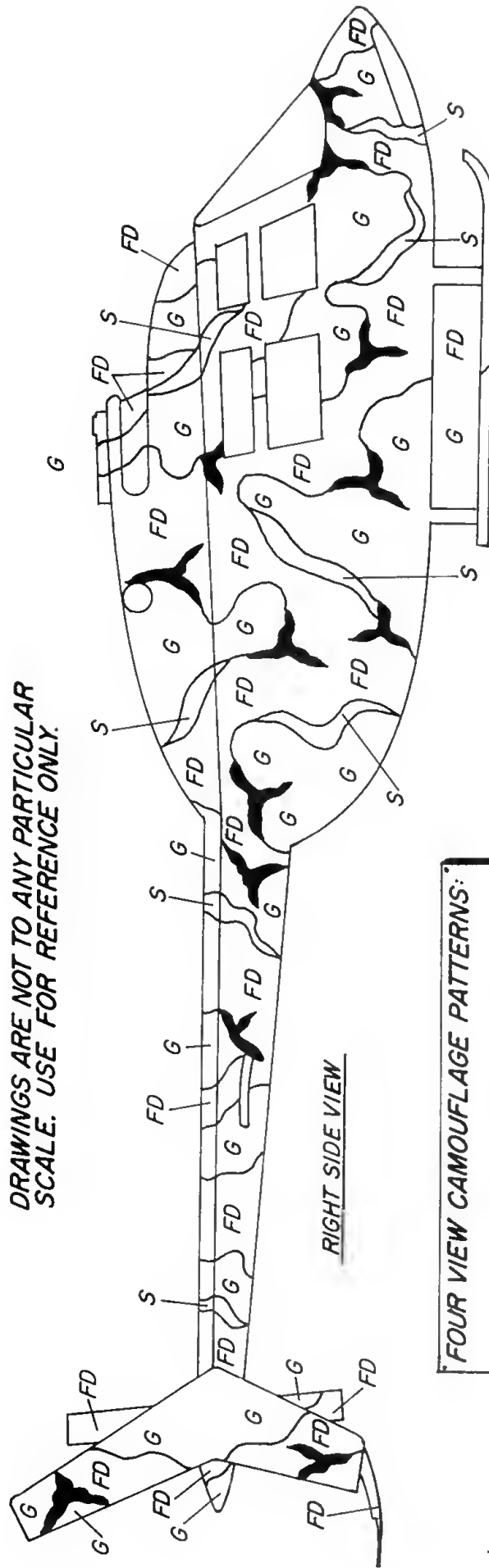


**COLOR CODE**  
 FD= FIELD DRAB 30118  
 G = FOREST GREEN 34079  
 S = SAND 30277  
 ● = BLACK 37038



TOP VIEW

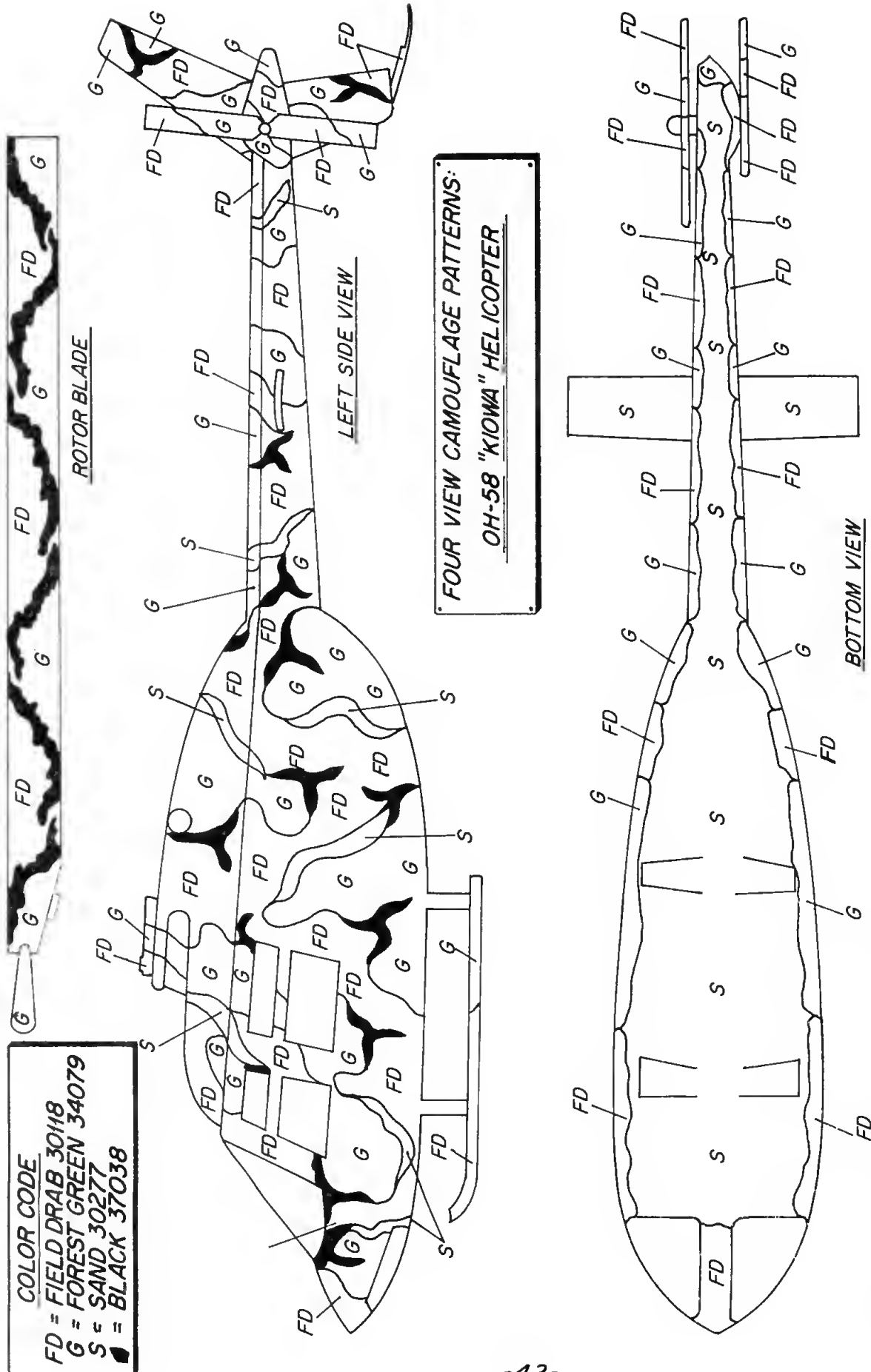
DRAWINGS ARE NOT TO ANY PARTICULAR SCALE. USE FOR REFERENCE ONLY.



RIGHT SIDE VIEW

**FOUR VIEW CAMOUFLAGE PATTERNS:  
 OH-58 "KIOWA" HELICOPTER**





## Soviet Medium Tanks; An Appraisal (Continued from Page 9)

while the tank is 'buttoned-up'. In comparison with western vehicles, there are some advantages as well as disadvantages built into the Soviet system. For example, the loader in Soviet tanks has a periscope above his position which may be rotated to provide visual coverage of the right side of the tank. The gunner's periscope, while not a sighting instrument, provides him with a non-obstructed view to the front of the tank that gives an advantage over narrow-field sights in terms of target recognition. On the other hand, the commander's cupola does not have enough periscopes in it to provide overlapping fields of vision from adjacent periscope blocks. This means, of course, that the commander has blind spots when viewing surroundings through the cupola optics. Technical comments have been received which indicate that periscope glass is not shatter-proof or of laminated construction; this means that the vision devices are vulnerable to enemy fire.

### NIGHT SIGHTING and DRIVING SYSTEMS

Virtually all Soviet medium tanks have been fitted (or retrofitted) with night sighting and driving vision systems. In all identified versions, this equipment has consisted of infra-red lamps and passive (receiver-type) sights which convert the infra-red illuminated image into a visible image, using electronics. In Soviet tanks, infra-red lamps are fitted in three locations, as follows: first, infra-red driving lights are fitted on the front of the vehicle and are used by the driver to view the terrain in front of his tank while on the move. Secondly, a large-diameter infra-red searchlight is mounted on the right side of the main gun (viewing forward); this searchlight is linked to the main gun so that it elevates with the weapon. The light, of course, traverses with the turret and it provides illumination upon the target which is then viewed in the gunner's telescopic sight. Thirdly, a small-diameter infra-red lamp is mounted above the commander's cupola, where it provides illumination for use of the target designator system at night.

Infra-red illumination systems are today considered obsolete and of secondary importance as there are numerous faults and disadvantages inherent within the system. In the west, this type of illumination system is being replaced by the completely passive 'starlight' light amplification systems. To date, no light amplification systems have been observed mounted on Soviet vehicles. Infra-red lamps project light which, while not visible to the naked eye, can easily be picked-up by enemy infra-red sights; thus, the infra-red equipped tank exposes itself to enemy fire or observation every time it turns on its lights. In addition, infra-red lights and 'receiver' sights are fragile in construction (according to Soviet manuals) and must be protected during storage. Infra-red lamps and sights must be covered during daylight to prevent deterioration to the lights and sights. In addition, the system is fairly limited in operational use; the effectiveness is directly in inverse proportion to the amount of light at night. For example, under moonlight conditions, infra-red lighting systems become virtually useless, and they are really only effective in total darkness situations. Even though infra-red systems are obsolete for combat, such systems should still be considered practical aids for night approach marches and for use within rear areas. Such systems will undoubtedly be of some importance for some time to come, even considering the disadvantages.

### NAVIGATION SYSTEMS

It is in the area of tank-mounted navigation systems that Soviet technology has produced equipment unparalleled in the west. Most of this type of equipment appears to be well-engineered and thought-out, and in theory offer considerable tactical advantages to tanks so equipped. Virtually all Soviet medium tanks have gyro-compasses mounted in the driver's compartment. Using the gyro-compass, tank drivers can maintain a compass course while driving in dim light or darkness. Such gyro-compasses can enable a driver to steer a straight course while the tank is being operated submerged under water (i.e., fording rivers and streams).

Comments have been received from a Czech source that Soviet command tanks (i.e., those of Company and Battalion commanders) are provided with a type of navigation system which plots the position of the vehicle in terms of map coordinates; using this system, the commander can pin-point the location of his vehicle (and thus his unit) on the map of the area. It must be indicated that the use of this type of equipment has not been verified by western sources, but it must be recognized that this type of equipment would be of considerable aid in a combat situation.

Most modern Soviet medium tanks are provided with a system of 'running' or 'position' lights, which have no parallel in western vehicles. This system consists of small lights which project beams of light toward the rear of the vehicle and also to the side (at adjustable angles). Vehicles using this system are assisted in maintaining a military formation in dim light or at night; in use, a driver can keep a constant bearing on other vehicular position lights and thus know the position and place of other vehicles within the unit formation by keeping track of their running lights. This is an interesting concept which seems to have been derived from nautical usage. Whether or not this system is of great practical use remains to be seen, as the days of rigid armored formations seem to have dropped into history to a great extent.

### SUMMARY

Continued on Page 45

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### SHILKA: Anti-Aircraft Defense on the Modern Battlefield (Continued from Page 20)

article. It is a fast, agile anti-aircraft system, capable of keeping-up with other armored units in the battle formation. Its highly effective target acquisition system — **GUN DISH** — and its high rate of fire make it a severe threat to any Soviet opponent seeking easy air superiority over the modern battle area.

As usual with Soviet systems, **SHILKA** has taken on more than one battlefield role. The latest observations conclude that it is now being deployed with batteries of the new SA-9 SAM, quad-mounted on BRDM vehicles. The **SHILKA**'s **GUN DISH** radar is used to direct four SA-9 units, for superior target acquisition and tracking. Included in this link is an ECM van-type truck, which would tend to protect the entire battery against ECM interference from enemy sources.

So, even though it is possible to defeat **SHILKA** using different tactics and sophisticated EW measures, the weapon system still retains its ability to force a stand-off situation in the air defense/air offense side of the battlefields of the late 1970's and early 1980's.

### 781st Tank Battalion in Combat (Continued from Page 38)

Seven Shermans of the 781st were attached to the 410th Infantry, and these tanks with infantry riding on them raced into Munsingen, causing confusion and panic among the Germans, many of whom obviously had no idea of the closeness of the Americans. Many of the Germans fled in panic without firing a shot; some hundreds were observed by the tankers to be fleeing up a hill in the town. Opening fire with all the guns they could bring to bear, the tanks forced many of the Germans to surrender.

The race to capture more and more of Germany was in full swing. Landsberg Prison was captured by the 1st Battalion, 409th Infantry, along with elements of the 781st. Landsberg was the prison where Hitler had written 'Mein Kampf', and his cell had been turned into a historical shrine complete with wall plaques. Then, on to Garmisch-Partenkirchen, where an eight-day blizzard held the Americans up. After the snow stopped, the tankers moved on towards Austria.

On May 2nd, Germany surrendered. On the 4th, the first and second platoons of the 781st's 'C' Company passed through the Tyrolean Alps toward the Brenner Pass. Not knowing if the Germans in the area had heard of the surrender, everyone was cautious and apprehensive. As the tanks approached a bridge near the pass, a German soldier stopped them with a swinging red lantern. He was fully armed with a machine pistol and grenades, but was actually there to warn them that the bridge was weak and, while they could cross, they should do so slowly. Soon, the 781st met members of the US Fifth Army from Italy. Within a week, all German forces had surrendered and the war was finally over.

After a month at Telfs, near Innsbruck, Austria, the 781st Tank Battalion was ordered to move to Le Havre, France, for movement to the United States. Many of the low-point men of the 781st anticipated being sent to the Pacific to help in the war against Japan; however, the atomic bomb dropped on Hiroshima ended the war before re-assignments could happen. The 781st was instead disbanded at Camp Campbell, Kentucky.

### Model Reviews (Continued from Page 31)

vehicle or small unit counters in a typical wargame. To many wargamers, this could impart a feeling of additional realism which may be lacking in board wargames.

Small War's new metal miniatures are cast in white metal, and are generally accurate replicas of the original vehicles, considering the extremely small size of the resulting miniatures (for example, the Panzer IV. model is approximately 9/16-inch in length). Most of the miniatures we were provided as review samples required light clean-up filing with a Swiss file, to eliminate mold seams and small amounts of flash. Side suspension detail is generally lacking in these small models; however, all vehicles can be easily recognized. A wide variety of these miniature vehicles are available, including U.S. Army M4A1 and M4A3 Shermans, M3 Stuart, M3 Lee, M7 Priest, 2½-ton Truck, M3 Halftrack, M10 Tank Destroyer, Jeep, etc. Models cover AFV's of Germany, Great Britain, Russia and Italy, in addition to the American vehicles listed above. Most pieces are \$.35 each; Jeeps and Kübelwagens are \$.25. Some aircraft models are also available.

These are nice little models which are more than accurate for their intended purpose, and they can add a great deal of realism to a board wargame such as 'Tobruk' or 'Tank!'. For more information on these models, drop a line to: Small Wars, Post Office Box 1614, Torrance, California 90505.

### The German Panzer II.D and Variants (Continued from Page 23)

The *Panzer II.* chassis to its logical conclusion. Although the end product was quite advanced with good top speed and powerful armament (for a light tank), it was also extremely cramped for its three-man crew and lack of fuel stowage kept the effective range down.

As can be seen, the *Panzerkampfwagen II., Ausführung D* and *E* were interesting variants of the basic *Panzer II.* Light Tank. Although not produced in great numbers, their design had a considerable influence on later German suspension developments, and in this area they can be considered important.

In spite of the praise from knowledgeable European authors, Soviet medium tanks have not fared well in combat. In the last two Arab-Israeli conflicts, the tank-versus-tank kills have been solidly in favor of the Israelis. There have been numerous reasons (and excuses) brought forth for the success of Israeli armor, and all of these reasons are interesting and informative as they concern failures within the Soviet tank/crew system. We should stress that the T-54, T-55 and T-62 are reasonably good tanks when crewed by competent crewmen; in fact, there are no real black-and-white, good-or-bad comments that should be made about Soviet medium tanks. They are generally good vehicles; however, there are a number of problem areas which have meant the difference between success and failure in combat. While it is difficult to put the vehicles into perspective, some factors must be mentioned in this summary of vehicular capabilities.

First and foremost are the 'crew' factors. Not only is the fighting compartment of the T-54, T-55 and T-62 designed for smaller personnel, it is extremely cramped for crew members, with a low turret roof and lack of movement space. The longer a crew must occupy and fight the vehicle without rest, the more fatigued they become and the less effective they become in combat. This is not to say that a good tank crew could not operate a T-62 in an excellent manner, but that same crew when compared to a similar crew in a Centurion, an M48A3, or an M60A1 would have a lower effectiveness due to the lack of crew space and the high level of fatigue as time passes.

The fire control and optical systems also have a number of faults, starting with the slow turret traverse system. The Arab-Israeli conflicts have shown that western tanks have constantly traversed and engaged Soviet tanks before the Soviet tanks could engage the western vehicles. This is in spite of the innovative target designator system used by the commander of the Soviet vehicle. The low

Continued on Page 47

#### The Baron's Bookshelf (from page 35)

credibility, as readers begin to wonder which caption is correct! On the whole, though, this publication is excellent in terms of text; the vehicular differences are clearly explained and small illustrations add a good deal in showing these differences between models. There are a number of small 1:87th scale four-view drawings which should prove very useful to modelers.

When one considers the modest price for this new publication, the value is well apparent. All things considered, this book is well worth acquiring even if you have the other publications in the Armor Series which duplicate coverage. Our sample was provided by the publisher; however, this volume should be available from most well supplied hobby stores.

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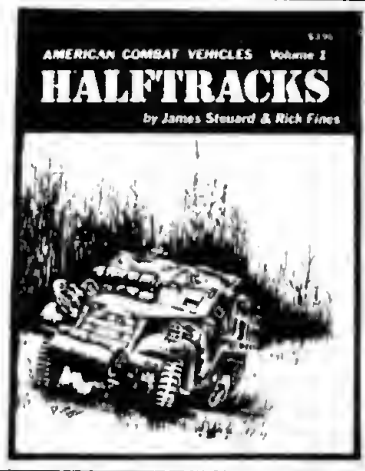
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profile of the turret has created the problems of poor gun depression (when compared to other tanks) and increased reloading time between rounds. The lack of a vehicular rangefinder further inhibits the system and places a heavy burden on the actions of the tank gunner in positioning his sights correctly for a potential hit. While the turret stabilization system permits fire during movement, the nature of the optical sights probably reduces the percentage of hits obtained on the move to a low figure.

When viewed as an overall system, Soviet tanks are reasonably simple to operate; however, vehicular maintenance still is unsatisfactory from a western standpoint. It should be stressed, though, that Soviet plans are to replace the entire vehicle rather than repair a broken system. With the large quantity of Soviet tanks on hand, this obviously becomes practical; however, poor reliability still would hinder operations and cut into operational strength during an attack.

While it is difficult to assess Soviet medium tanks on an overall basis, we hope that this article has provided an evaluation of the vehicles which will help to put them in the proper perspective when compared to other armored vehicles of the world.

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*In addition to the references listed above, numerous help was obtained from European correspondents. Special thanks are voiced to CPT Dwight C. McLemore and to 1LT Norman G. Dean III, for their help and comments. Without the help of these and other individuals, this article would never have been put together.*

Muzzle Blast; Letters to the Editor (Continued from Page 4)

the planned trips, will I take 35mm photos of their favorite AFVs or Halftracks for them!!!

I have given this idea a lot of thought and have decided to offer my services to all serious AFV buffs as there are still numerous places that I wish to visit in Europe that I missed in '74 and '75 that have many other rare and interesting AFVs!!! I visited about thirty places in Europe that had AFVs on display during my visits in 1974 and 1975, and I can tell you that there are many other places to seek out!!!

I'm asking a donation of \$100.00 from each interested AFV buff and right at the moment I have many interested persons. The \$100.00 donation will provide that I will take photos of the AFVs that I see; I will be sending out lists of the places that I intend to visit and all AFVs will be listed on these lists. All one has to do is to check off his favorite AFVs on the lists that he wants photographed. Of course, I can't take photos of each vehicle that I see for each person that is interested, rather I would like each person to pick **his** or **her** favorite AFVs and I will take the desired photos wanted! Each person will receive the negatives of the photos taken, but will be limited to 50 photos. So, each person will receive 50 color 3x5 prints plus the negatives, at a cost of \$2.00 per photo, which isn't bad at all when you think of it. I plan to use color film since most people I

have talked with want color prints.

I plan to go back to Europe next June or July. Here is a list of the places that I plan to visit: RAC Tank Museum, Bovington. The Swiss AFV Museum at Thun. The Dutch AFV Museum, The Overloon AFV Battle Area Museum, Münsterlager Training Area Museum in Germany, and a few others. I'm now contacting all of these museums and their curators for information, etc. If next year's AFV Expedition is a success, I plan to go on more such trips to other countries each year that have AFV museums, such as Sweden, Russia, Italy, Finland, France, Denmark, etc. — so your support is needed!!! Many AFV buffs have stated to me that this is a great way of getting photos of the AFVs in Europe, as many of them can't get away from work and family responsibilities. If you are interested, please contact me, as I'm limiting this offer to only fifty people!!!

Sincerely yours,  
Gary L. Simpson  
1800 1/2 N. 17th St.  
Boise, Idaho 83702

#### ...A VEHICLE FOUND...

Dear Editor:

For your staff and yourself, and all the other armor buffs around, a unique find has been found; a U.S. T-28 Heavy Tank, one of two that existed (the other was destroyed by fire). This vehicle has been located in the woods of Fort Belvoir, Virginia by a Mr. Gil Buhrmann.

Fortunately for this tank, it will be transported to the Patton Museum, at Fort Knox, Kentucky. The T-28 is in fair shape, and all the original equipment seems usable. After it is eventually restored, it will move under its own power.

This is a unique find, and let's hope that more discoveries like this will be found in the near future.

Thank you,  
Dan Ciolek  
Terre Haute, Indiana

#### ...AND SOME PRAISE.

To the Editor:

Recently, at my local hobby shop, I purchased a copy of your latest issue, Vol.5 No.9, which contained an article that gave me the information that I needed to construct my model 'RSO/1' tractor.

The article on the German Raupenschlepper Ost by Gary Simpson was great, and this in turn, made me think of the previous issue with the article by James Steuard and the drawings by Y. Tomioka which gave me the necessary information to fully construct my model with super detailing and other little last minute adjustments.

So keep up the fine work. My thanks to you fine magazine and to your staff.

Cheers,  
Mark Harrington  
Indianapolis, Indiana



